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of Engineers

Louisiana Coastal Protection and Restoration

ENCLOSURE A

State of Louisiana's Comprehensive Coastal Protection Plan Formulation Report

Preliminary Technical Report to Congress
June 2006

LOUISIANA COMPREHENSIVE COASTAL PROTECTION MASTER PLAN PLAN FORMULATION REPORT

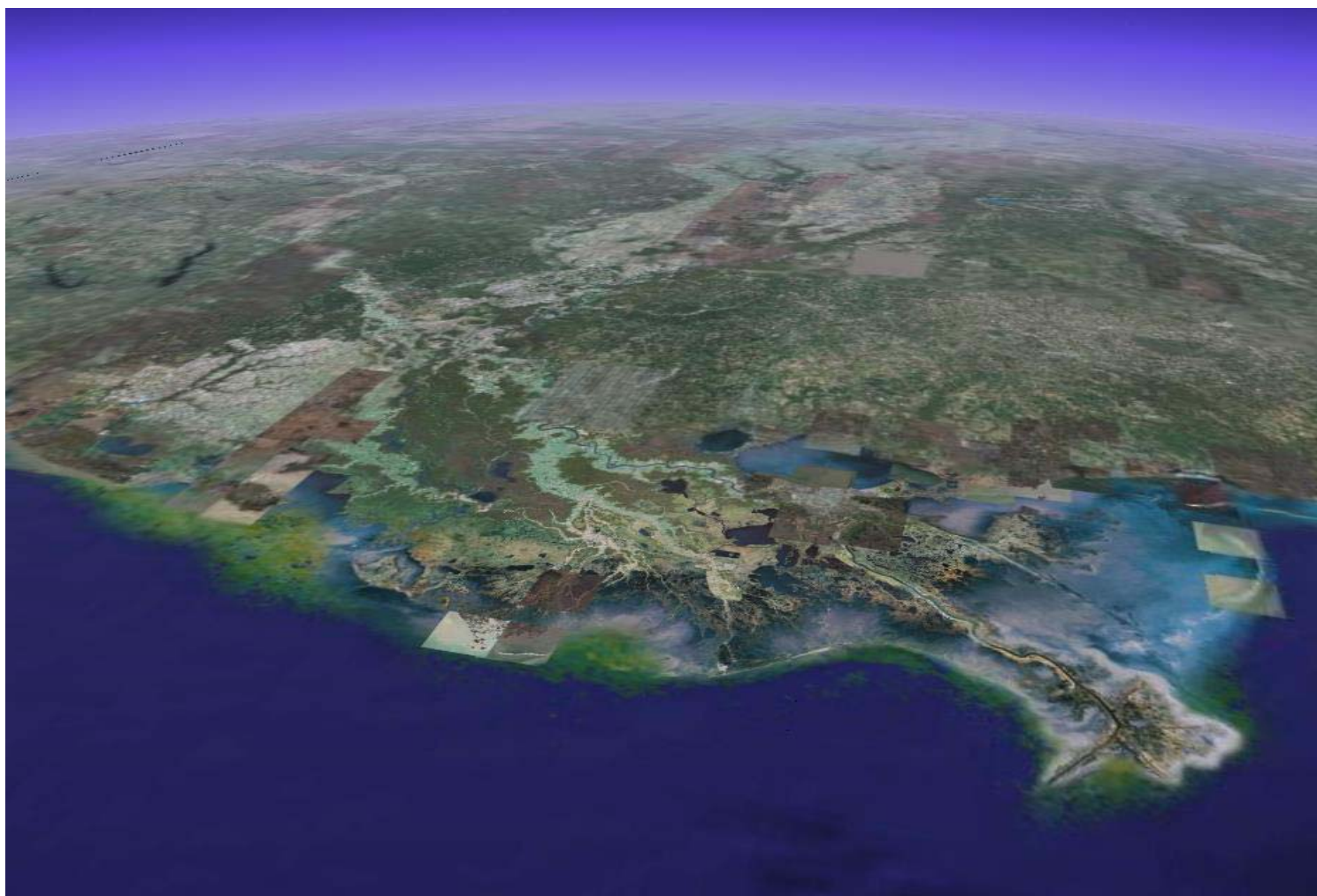


Image: Louisiana coastline from 128 miles above, collage via Google Earth (Google 2005, Terrametrics 2006, Europa Technologies 2006)



**Louisiana Coastal
Protection and Restoration
Authority**

May 2006

**LOUISIANA COMPREHENSIVE
COASTAL PROTECTION
MASTER PLAN
PLAN FORMULATION REPORT**

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Protection and Restoration Authority

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EXECUTIVE SUMMARY

The Louisiana Legislature established the Coastal Protection and Restoration Authority (CPRA) to develop, implement, make reports on, and provide oversight for a comprehensive coastal protection master plan (Master Plan) and annual coastal protection plans, working in conjunction with state agencies, political subdivisions, including levee districts, and federal agencies. The Master Plan will clearly portray the State's desires and needs relative to hurricane protection and coastal restoration, integrating these efforts in order to achieve long-term and comprehensive coastal protection. The Master Plan will include a comprehensive strategy addressing the protection, conservation, and restoration of the coastal area through the construction and management of hurricane protection projects and coastal restoration projects and programs. The CPRA, instructed by legislation to use "an integrated team effort", established an Integrated Planning Team (IPT) to develop the Master Plan. The CPRA, in order to coordinate with and maximize the efforts of other ongoing protection efforts, particularly that of the U. S. Army Corps of Engineers (USACE), directed that the Master Plan be developed on an expedited schedule.

Program Purpose and Principles

The purpose and program principles of the Master Plan have been set out to define the rules by which the plan formulation process is being conducted. Plan formulation principles have also been defined to serve as the basic truths that cannot be violated during plan formulation. Two purposes were developed: (1) in order to provide for the well-being of the people of Louisiana and thus the Nation, the State of Louisiana must formulate and implement a strategy for long-term comprehensive coastal protection including policies, plans, and programs that integrate a sustainable solution to hurricane protection and coastal restoration; and (2) in order to achieve comprehensive coastal protection, the plan must accommodate multiple uses of the coastal zone. Seven coastwide planning objectives were established for the Master Plan.

Rationale and Scoring Criteria

A specific rationale for planning the future of coastal Louisiana is clearly needed. Decisions regarding the critical factors such as cities, towns, and rural communities; quality of life; economic; business, industrial, institutional, strategic, and other criteria have been developed for the Master Plan based on logic and objectivity. First, a long-term time-frame in which to carry out recovery, protection, and restoration of the coastal zone was set at a 100-year horizon, in which short-term, intermediate, and long-term projects and measures could be planned, implemented, and maintained.

Second, boundaries for five planning units were established based on hydrologic basins and watersheds, using the existing Louisiana Coastal Area (LCA), Louisiana Ecosystem Restoration Study Report (LCA Study). The four sub-provinces were carried forward from the LCA Study as planning units, but the third sub-province was divided into 3a and 3b based on the relative influence of the Atchafalaya River in these areas. This was done because the function disruptions and the opportunities for restoration are different in these areas. The five planning units are (1) East of the Mississippi River, (2) Mississippi River to Bayou Lafourche, (3a) Bayou

Lafourche to Bayou de West, (3b) Bayou de West to Freshwater Bayou, and (4) Freshwater Bayou to Sabine River.

A consistent set of criteria that could be appraised in a transparent and coordinated way was developed, and a scoring procedure was applied for all the planning units on the coast. This then provided the basis for definition of Planning Unit objectives against which potential measures can be appraised.

In order to provide clear and consistent reporting, the human and natural environment appraisals for each Planning Unit are presented in a tabular format. All assessments are based upon review of existing reports and data, both in terms of the current status and in relation to possible future threats. These tabulated assessments are supported by fuller descriptions of each Planning Unit to provide the context for the detail in each individual table.

Numerous sources of data were used to determine the baseline coastal conditions, including Louisiana and Gulf of Mexico Geographical Information Systems (GIS). A GIS has been developed for the Master Plan that will be used as an effective coordination, analysis, and presentation tool because it can be used to develop and depict geographic features and spatial (geographic) relationships between Louisiana's human and natural resources. This tool will allow users to create and store spatially related layers from a variety of datasets and rapidly analyze and deploy information regarding the Master Plan.

Plan Formulation Rationales

Two protection/restoration rationales were developed for each planning unit based on all of the above discussed factors, criteria, rankings, and scores. In the first rationale, the strategy for selection of protection and restoration measures is summarized as follows:

‘Provides for maximum structural protection, without constraints by local (asset) benefit/costs. Landscape features will be created and sustained using mechanical means. Long-term O&M costs are not a constraint at this stage of plan formulation.’

Specifically, this rationale was applied using the following parameters:

1. Maximum hurricane protection for all communities where technically feasible (using judgment at this stage).
2. Minimize overall length of flood protection features regardless of primary wetland impacts (with regard to technical feasibility and maximizing efficiency). Projects will be designed to avoid, minimize, or mitigate primary wetland impacts of any alignment.
3. Ecosystem restoration projects or combinations maximize acres of wetlands and other coastal features in the near term (e.g. long distance pipeline of material for creation of land). Sustainability will be provided by mechanical methods.

In the second rationale, the strategy for selection of protection and restoration measures and alternatives is summarized as follows:

‘Provides for variable levels of structural protection with non-structural alternatives for protection (e.g. coastal restoration, evacuation planning, raising or relocating assets). Projects will reflect benefit/cost constraints and include self-sustaining environmental options. Long-term O&M costs will be minimized.’

Specifically, this rationale was applied using the following parameters:

1. Variable hurricane protection for all communities where feasible; level of protection defined by assessment of risk to the human economic assets (based on analyses of concentrated and distributed assets).
2. Minimize overall system impacts by minimizing flood protection project disruptions to wetland ecosystems (e.g. minimize acres of wetlands impounded, minimize constrictions to normal hydrologic exchange, maximize non-structural solutions, use natural landforms).
3. Ecosystem restoration projects or combinations ensure self-sustaining processes are restored (i.e. large-scale diversions to build and sustain wetlands, or combine marsh creation with smaller diversions to sustain wetlands).

Planning Units

Initial objectives, measures, and alternative plans were developed, and outputs for each planning unit were subjected to thorough review by resource agencies, local government representation, levee districts, non-government organizations, and academia. In this document the following information is provided:

1. An overview and a description of alternative plans;
2. Five figures, (a) boundary and base map, (b) concentrated and distributed assets map, (c) ecosystem units map, (d) Alternative Plan One map, and (e) Alternative Plan Two map;
3. Eight tables, (a) relative damages from storm surge to concentrated assets and distributed assets in 2 tables, (b) concentrated assets and distributed assets scoring in 2 tables, (c) distributed assets description table, (d) natural resource existing conditions and problem identification table, (e) changes in natural resources, 1990-2050, table, and (f) a combined table of assets risks, objectives, and measures.

Alternative Plan and Recommendations

Alternative plans are based on the plan formulation process and the input provided during an Interdisciplinary Technical Team (ITT) workshop held on 1 May 2006. The ITT was comprised of resource agency, local government, levee district, non-government organization, and academia. More than 100 people attended the workshop. Further work was gained at a Strategic Design Team (SDT) workshop on 5 May 2006. At that time, priority measures were also identified that held broad-based stakeholder support, were of significant and immediate need, and were in a location where limited solutions existed to address the need. The State of Louisiana and the USACE have discussed these recommendations, and are writing supporting documentation for each.

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Note: PU = Planning Unit

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Note: PU = Planning Unit

1 OVERVIEW

1.1 INTRODUCTION

In light of the new challenges facing coastal Louisiana since the hurricanes of 2005, a focused effort must be initiated to develop a comprehensive coastal protection plan that integrates hurricane protection and conservation and restoration of the coastal area. In addition to immediate needs for hurricane protection, coastal land loss continues in catastrophic proportions. Wetlands loss threatens valuable fish and wildlife production and the viability of residential, agricultural, energy, and industrial development in coastal Louisiana. This integrated plan must provide for protection of coastal communities and infrastructure, as well as for restoration of coastal ecosystems. Further, it must be evaluated based on its benefits in reducing storm damage to coastal communities and infrastructure, as well as for its ecosystem impacts and benefits.

The Louisiana Legislature established the Coastal Protection and Restoration Authority (CPRA) to develop, implement, make reports on, and provide oversight for a comprehensive coastal protection master plan (Master Plan) and annual coastal protection plans, working in conjunction with state agencies, political subdivisions, including levee districts, and federal agencies. The Master Plan will clearly portray the State's desires and needs relative to hurricane protection and coastal restoration, integrating these efforts in order to achieve long-term and comprehensive coastal protection. The Master Plan will include a comprehensive strategy addressing the protection, conservation, and restoration of the coastal area through the construction and management of hurricane protection projects and coastal restoration projects and programs. The CPRA, as instructed by legislation, established an Integrated Planning Team (IPT) to develop the Master Plan. The CPRA, in order to coordinate with and maximize the efforts of other ongoing protection efforts, particularly that of the US Army Corps of Engineers (USACE), directed that the Master Plan be developed on an expedited schedule.

Since at least 1960, there has been concern over changes occurring within coastal Louisiana. In 1980, the Coastal Zone Management Program was enacted into Federal law, and Louisiana as well as all other states developed a Plan of Action that is still being implemented. In 1990, Congress passed the Coastal Wetlands, Planning, Protection, and Restoration Act (CWPPRA), which is overseen by five Federal agencies and the State of Louisiana. It has enabled the State of Louisiana Department of Natural Resources and its Federal Partners to have some funding for regional scale coastal restoration projects, and to develop (1) an Annual Priority Project List Report (beginning in 1991), (2) the Louisiana Coastal Wetlands Restoration Plan with its 10 appendices (1993), (3) a Quality Management Plan and Monitoring Program, (4) the Coast 2050 Plan of Action with its 6 appendices (1998), and (5) a Revised Coast 2050 Plan (2001). The Louisiana Coastal Area (LCA), Ecosystem Restoration Plan, report (2004) with its 12 appendices was prepared by the USACE with the State of Louisiana. This plan was developed with input from all resource agencies, stakeholders, and the public at large. Although not a comprehensive solution to the challenges facing coastal Louisiana, it lays the groundwork for a major restoration and protection effort. Numerous studies, interagency and agency engineer manuals and handbooks, and technical reports by the USACE, Natural Resources Conservation Service, U. S. Geological Survey, and U. S. Fish and Wildlife Service have also been compiled over the past 30 years that include data on the Mississippi River and other rivers pertinent to Louisiana's

sediment sources, and Coastal Louisiana data as they relate to problems on the Louisiana coast (listed in Chapter 8 References and Sources).

At the same time, other nations have been faced with similar problems with their shorelines, wetlands, and river deltas, such as the Netherlands and Venice, Italy. In developing the formulation process for the Master Plan, the approaches of these other nations were reviewed, and the strategic approach used in the United Kingdom (UK) was identified as the most suitable. This approach has been developed over the past 15 years by the UK Department of Environment, Food, and Rural Affairs (formerly the Ministry of Agriculture, Fisheries, and Food). A number of pertinent publications are listed in Chapter 8 References and Sources.

1.2 MASTER PLAN PURPOSE AND PRINCIPLES

The purpose and program principles of the Master Plan have been set out to define the *rules* by which the plan formulation process is being conducted. Plan formulation principles have also been defined to serve as the *basic truths* that cannot be violated during plan formulation.

1.2.1 Purpose

- In order to provide for the well-being of the people of Louisiana and thus the Nation, the State of Louisiana must formulate and implement a strategy for long-term comprehensive coastal protection including policies, plans, and programs that integrate a sustainable solution to hurricane protection and coastal restoration.
- In order to achieve comprehensive coastal protection, the plan must accommodate multiple uses of the coastal zone.

1.2.2 Program Principles

- The State and Nation must act to provide protection to coastal Louisiana through the use of a holistic, comprehensive plan incorporating structural and non-structural measures.
- The State and Nation must act to conserve, restore, create, and improve wetlands and barrier shorelines or reefs in coastal Louisiana while encouraging responsible use of coastal resources and recognizing that it is in the public interest of the people of Louisiana to establish a balance between sustainable development and conservation.
- Development of the Master Plan will require the participation, input, and support of the numerous and diverse interests that live, work, and play in coastal Louisiana, along with that of national interests who depend upon our coast's continued health and existence.
- In order to achieve a long-term solution of comprehensive coastal protection, hurricane protection and coastal restoration must be integrated and should be evaluated on a 100 year planning horizon to understand future implications of current actions.
- An established, standardized procedure and values rating system must be followed that will allow reasonable and informed decisions between and within planning units.

- The protection and restoration of coastal Louisiana will be an ongoing and evolving process. The selected plan should include an effective monitoring and evaluation process that reduces scientific uncertainty, assesses the success of the plan, and supports adaptive management of plan implementation.
- The plan must be reviewed on a regularly scheduled basis, and also after catastrophic events, and reformulated as necessary to respond to changing economic, social, and environmental conditions.
- In the course of restoring a sustainable balance to coastal Louisiana, sensitivity and fairness must be shown to those whose homes, lands, livelihoods, and ways of life may be adversely affected by the implementation of any selected alternatives. Displacement and dislocation of resources, infrastructure, and possibly communities may be unavoidable under some scenarios.
- Any evaluation of impacts will be consistent with the National Environment Policy Act (NEPA) mitigation process to avoid, minimize, rectify, reduce over time and then, if necessary, compensate for project-induced adverse impacts.
- Recognizing that disturbed and degraded ecosystems can be vulnerable to invasive species, implementation needs to be coordinated with other State and Federal programs addressing such invasions, and project designs will promote conditions conducive to native species by incorporating features, where appropriate, to protect against invasion to the extent possible without diminishing project effectiveness.
- Storm damage reduction can be achieved by many combinations of strategies, such as strong inner defenses, sustainable wetland landscapes, floodgates or barriers on channels, barrier island restoration, building codes, and evacuation routes.

1.2.3 Plan Formulation Principles

- As defined by Act 8 of the First Extraordinary Session of 2005, coastal protection means plans, projects, policies, and programs intended to provide hurricane protection or coastal conservation or restoration.
- The viability of residential, agricultural, energy, fish, and wildlife production, and industrial development in coastal Louisiana is dependent on a sustainable coastal ecosystem.
- For the benefit and protection of the state as a whole, its citizens and its localities, hurricane protection is vital to survival.
- In order to provide integrated coastal protection, the frequency and severity of inundation must be reduced to ensure sustainable and productive coastal habitation.
- Synergies between traditional flood and storm protection measures and coastal restoration opportunities must be encouraged, and cost-effective solutions must be sought.

- Appreciation of the natural dynamic nature of the coastal system must be integral to the planning and selection of preferred alternatives. This should include the risk associated with tropical storms, river floods, and droughts.
- Net nutrient uptake within the coastal ecosystem is maximized through increased residence time and the development of organic substrates, and thus project design should promote conditions that route riverine waters through estuarine basins and minimize nutrient export to shelf waters.
- Limited sediment availability is one of the constraints on system rehabilitation. Therefore, plan elements including mechanical sediment retrieval and placement may be considered where landscape objectives cannot be met using natural processes. Because sediment mining can contribute to ecosystem degradation in the source area, such alternatives should, to the extent practicable, maximize use of sediment sources outside the coastal ecosystems.
- Constraints on protection and restoration must be acknowledged in plan formulation. Such constraints may include resource limitations (e.g., sediment availability, freshwater sources, funding), scientific or technical uncertainties (e.g., subsidence and sea level rise rates, effectiveness of certain restoration techniques), and socio-economic considerations (public acceptability of proposed actions; preferred land uses such as agricultural, residential, industrial, fisheries).
- The level of detail provided for a measure may only be as great as the level of understanding of the problems, needs, and opportunities for a region. Approaches to reducing uncertainties in proposed actions that will lead to implementation of less uncertain concepts should be described.
- Projects will be designed and implemented in the most cost efficient manner using appropriate engineering, economic, and scientific criteria.
- Design, construction, and operation of flood and storm protection measures should avoid or minimize significant adverse impacts to the coastal ecosystem.
- Protection and restoration alternatives that minimize long-term operation and maintenance costs will be preferred. For example, restoration measures should always be considered in conjunction with levees in order to minimize exposure of hard structures to open Gulf conditions. Further, restoration alternatives that rely on natural cycles and processes for ecosystem sustainability will be preferred.

1.3 COASTWIDE PLANNING OBJECTIVES

A series of ‘Coastwide Planning Objectives’ have been defined which identify overall aspirations, which the Master Plan will seek to deliver.

- A. Reduce storm damage vulnerability of coastal communities, resources, and infrastructure.
- B. Minimize exposure of traditional flood protection measures to open Gulf conditions.
- C. Increase sediment input from sources outside estuarine basins, and manage existing sediment resources within estuarine basins, to sustain and rejuvenate existing wetlands, rebuild marsh substrate and construct flood protection projects.
- D. Maintain or establish natural landscape features and hydrologic processes that are critical to sustainable ecosystem structure and function, including dissipation of storm energy.
- E. Establish or maintain dynamic salinity gradients that reflect natural cycles of freshwater availability and marine forcing (fluctuation related to normal daily and seasonal tidal action or exchange).
- F. Sustain productive and diverse fish and wildlife habitats.
- G. Maximize retention of river-borne sediments and nutrients within coastal wetlands.

1.4 PLAN FORMULATION OVERVIEW

Many planning efforts are currently underway to address the challenges now facing coastal Louisiana, and each has its own time schedule. Three of these efforts will directly address various aspects of coastal protection and restoration: The USACE Louisiana Coastal Protection and Restoration (LaCPR) report, the Louisiana Recovery Authority (LRA) Louisiana Speaks initiative, and the CPRA Master Plan.

These planning processes are being integrated to the greatest extent possible, to ensure that all sources of relevant information – from public comments to formal reports – are considered. The final product should be an integrated, consensus-based solution to the need for coast-wide storm protection and ecosystem restoration that all use in the generation of their required reports.

Because results from this plan formulation process will affect all three of the efforts mentioned above, the schedule reflects milestones necessary to meet deadlines already in place in all of these efforts. The schedule also allows for one round of plan reformulation based on modelling and evaluation outputs. Specifically, the schedule reflects deadlines required in order for results from this process to be used to guide the USACE LaCPR Preliminary Technical Report to Congress due 30 June 2006, and Final Technical Report due December 2007; the LRA Louisiana Speaks stakeholder meetings, occurring in mid-July and again in January 2007; and the CPRA first draft Master Plan, due in mid-October 2006.

An Interdisciplinary Technical Team (ITT) was convened for a workshop on 1 May 2006 to provide input to the development of the Master Plan and provide a technical review of draft

outputs. The ITT comprised resource agency, local government, levee district, non-governmental organization, and academic personnel. A Strategic Design Team (SDT), comprised of policy level personnel from resource agencies, was also convened for a second workshop on 5 May 2006 to review the plan formulation process and review draft recommendations for inclusion in the USACE LaCPR preliminary technical report.

A multi-tiered process has been identified to reach the final preferred coast-wide protection and restoration (coastal protection) plan that will be used in all related planning efforts.

1.5 PLAN FORMULATION PROCESS

Figure 1, below, illustrates the process through which existing knowledge and understanding of the Louisiana coast has been used to define the alternative plans that will be carried forward for analysis.

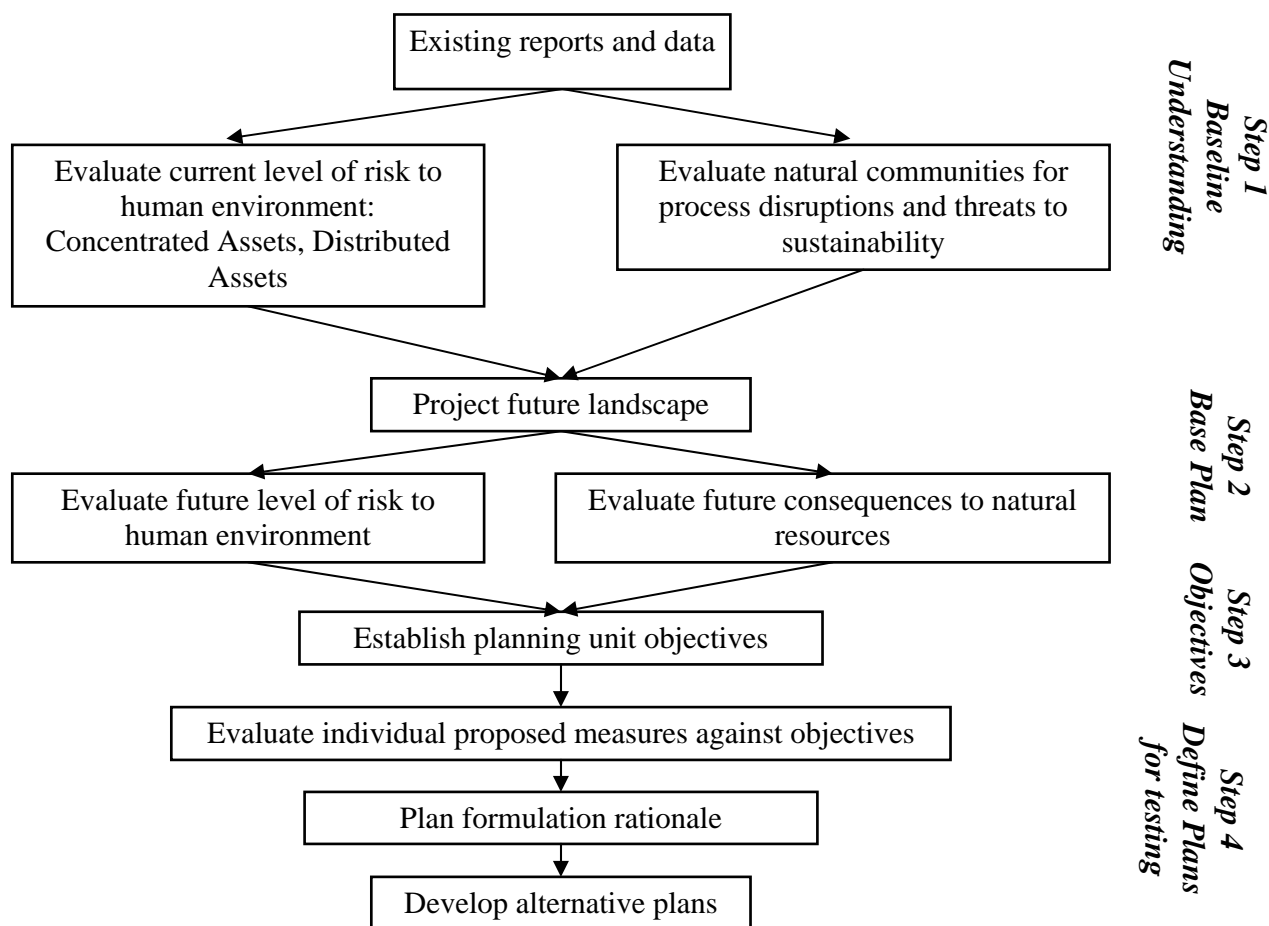


Figure 1.1 Schematic diagram illustrating the alternative plans formulation process.

The Louisiana coast was divided into five planning units, which represent coastal hydrologic divisions. The planning units divide the coast into more manageable sections and provide a

consistency with the breakdown previously used for the Louisiana Coastal Area, Louisiana Ecosystem Restoration Study (LCA).

Step 1. The *‘baseline understanding’* portion of the process began with the collation and review of existing knowledge to address and document the ‘problem’ for which the Master Plan is being developed. Existing knowledge defined the current level of risk for the human environment and the process disruptions for the natural environment. The human environment has been considered in terms of ‘Concentrated Assets’ (which include communities and other groupings of built assets) and ‘Distributed Assets’ (including built assets external to the ‘concentrations’, such as highways, waterways and oil and gas facilities). Review of these assets has considered both what the assets are and their present level of flood risk and protection. The natural environment review has considered the status of ecosystem units and the processes disruptions presenting threats to them (e.g. subsidence, disruptions to the natural hydrologic processes).

The coastwide baseline understanding has been summarized into an overview for each Planning Unit, presenting the status of the Planning Unit and its assets.

Step 2. The current level of risk for the human environment and the process disruptions for the natural environment were used to project the future landscape in order to develop a *‘base plan’*. The base plan describes how the coast would evolve over the next 100 years, assuming existing levels of protection are maintained (with repairs to pre-Katrina levels) and CWPPRA projects authorized for construction. Assessment of the base plan has considered the physical evolution of the coast to forecast its future landscape and hence the implications for natural and human assets respectively. This was then used to evaluate the future level of risk to the human environment and evaluate future consequences to natural resources.

Step 3. The base plan implications were used as the basis for defining specific *‘planning unit objectives’*. These objectives address the specific future risks and impacts identified. These objectives do not define rules for the Master Plan, but aspirations, which the plan will aim to achieve, while accepting that it may not be possible to achieve all objectives. The objectives cover both hurricane protection and coastal restoration, and provide a geographically specific representation of the Coastwide Planning Objectives.

For each Planning Unit, the objectives are presented in an ‘Objectives vs. Measures Table’.

Step 4. The possible ways of achieving these objectives are then used to *‘define alternative plans for testing’*. From the existing knowledge and reports, a list of known proposed measures has been compiled, to define a list of options for future management of the coast. As shown in the objectives vs. measures table, this list of measures has been evaluated against the planning unit objectives to identify those which might achieve the objectives, and also those which may have a negative impact on the aim of an objective.

This appreciation of the potential benefits and impacts of the measures has been used to define two alternative coastwide plans, based upon the ‘plan formulation rationales’. These alternative plans represent first attempts at the definition of consistent plans for the coast. Resulting

alternative plans will then be taken forward for detailed modelling and evaluation, as presented in Section 1.9.

1.6 RATIONALE AND SCORING CRITERIA

The preceding information points to the need for a specific rationale for planning the future of Coastal Louisiana. Decisions have been made regarding purpose, objectives, time-frames, and ways to evaluate all of the critical factors that make up the coastal environment (human and natural). First, a long-term time-frame in which to carry out recovery, protection, and restoration of the coastal zone was set at a 100-year horizon, in which short, intermediate, and long-term projects and measures could be planned, implemented, and maintained.

Second, boundaries for five planning units were then established based on hydrologic basins and watersheds, using the existing LCA study. The four sub-provinces defined for the LCA Study were carried forward as planning units, but the third sub-province was divided into planning units 3a and 3b based upon the relative influence of the Atchafalaya River in these areas. This was done because the system disruptions, as well as the opportunities for restoration, are different in these areas. The five planning units are (1) East of the Mississippi River, (2) Mississippi River to Bayou Lafourche, (3a) Bayou Lafourche to Bayou de West, (3b) Bayou de West to Freshwater Bayou, and (4) Freshwater Bayou to Sabine River. These are illustrated in Figure 1.2.

Third, a consistent set of criteria that could be used to conduct a first-cut appraisal of the human and natural environment assets and risks in a transparent, coordinated, and open way was developed. This was applied for all the planning units on the coast. This then provided the basis for definition of Planning Unit objectives against which potential measures are appraised. Alternative plans developed from this exercise will be carried forward for detailed modeling, to better evaluate each plan's ability to meet objectives.

In order to provide clear and consistent reporting, the human and natural environment appraisals for each Planning Unit are presented in a tabular format. All assessments are based upon review of existing reports and data, both in terms of the current status and in relation to possible future threats. These tabulated assessments are supported by descriptions of each Planning Unit, to provide the context for the information in each table.

Numerous sources of data were used to determine the baseline coastal conditions, including Louisiana and Gulf of Mexico Geographical Information Systems (GIS). A GIS has been developed for the Master Plan that will be used as an effective coordination, analysis, and presentation tool because it can be used to develop and depict geographic features and spatial (geographic) relationships between Louisiana's human and natural resources. This tool will allow users to create and store spatially related layers from a variety of datasets and rapidly analyze and deploy information regarding the Master Plan.

The following sections set out the definitions, process, and assumptions used to appraise the Planning Unit assets and risks, and define planning unit objectives.

1.6.1 Human Environment

Review of the human environment has focused upon those built assets that are important for human habitation of the Louisiana coastal zone. The assessment has been divided into ‘Concentrated Assets’ and ‘Distributed Assets’. These Concentrated Assets represent significant groupings of built assets such as cities, towns, communities, or important industrial/infrastructure areas. The Distributed Assets then identify the other important human structures, outside the concentrated areas, within the Planning Unit, such as highways. The Planning Unit overview text for each unit identifies the linkages and synergies between the assets set out in the two sets of tables.

1.6.1.1 Definition of Concentrated and Distributed Assets

Identification of the Concentrated Asset groupings was undertaken using the following rationale:

- consistent groupings between Planning Units;
- consistent land elevation;
- consistent flood risk exposure; and
- broadly consistent character (to include whole communities).

The Distributed Asset groups were then defined using separate rationale:

- important built assets outside the Concentrated groupings;
- consistent landforms and elevation;
- consistent potential surge impacts

Together, the Concentrated and Distributed Asset groupings provide a complete geographical coverage of the coastal zone within each planning unit. A map indicating these groupings is provided for each planning unit.

1.6.2 Flooding and Land Loss Risks

For each of the Concentrated and Distributed Asset groupings within a Planning Unit, an appraisal was made of the current level of flooding risk under a range of possible storm surge elevations. This provides a description of the vulnerability of these assets to damage under various storm surge conditions.

The Saffir/Simpson storm surge category is defined by pressure, wind and storm surge. There is not a one-to-one relationship between these elements. The central pressure ranges of hurricanes on the Saffir/Simpson Hurricane Scale (SSHS) will usually agree fairly well with the wind ranges in that category. However, storm surge is strongly dependent on the slope of the continental shelf (shoaling factor). This factor can change the height of the surge by a factor of two for a given central pressure and/or maximum wind. Given this potential variation in surge levels, which are the primary cause of flooding damages for any particular Hurricane Category, it is considered more meaningful to consider risks under specific surge heights rather than storm category, as the latter could give a wide variety of flood impacts.

For the baseline assessments, the likely extent of flooding damage under surges of 5, 10, 15, 20, 25 and 30 feet has been assessed. To quickly assess the impacts of such storm surge at the coast, a Sea, Lake and Overland Surges from Hurricanes (SLOSH) model was run for all five planning units for the six storm surge levels to give some information on risks to assets. Other models are also being prepared for more detailed analysis that will be completed within the next several months.

1.6.2.1 Relative damage from Storm Surges (Tables 1 and 3 in each PU chapter)

For each of the Concentrated and Distributed Asset groupings within a Planning Unit, an appraisal was made of the current level of flooding risk, described in terms of the proportion of assets that would likely be damaged or destroyed by flooding, under each surge level. Using records of historic damages, combined with knowledge of the communities and pre-defined terminology, relative damages and risks were established for a qualitative risk assessment. Relative damages to a particular asset grouping were described using the terminology listed below:

Band		Description
EL	Extremely Low	Some flooding of low-lying roadways and uninhabited areas; minor erosion.
L	Low	Flooding of low-lying roadways and uninhabited areas; flood damage to a smaller structures; minor to moderate erosion.
M	Medium	Flooding near the coast impacts smaller structures; larger structures receive some damage; moderate erosion.
H	High	Flooding severely impacts; larger structures receive damage; high erosion.
EH	Extremely High	Flooding destroys smaller structures; larger structures are severely impacted; floodwaters overtop tidal levees; high erosion; saline water impact coastal resources.

Tables presenting the ‘Relative Damage from Storm Surge’ to Concentrated and Distributed Asset groupings are provided for each Planning Unit.

These assessments assume that existing flood defense structures are in place to pre-Katrina levels of protection. No attempt has been made to attribute a probability of occurrence to the surge levels described above at this baseline stage, as the surges are simply being used as a means to define the overall level of risk.

The flood risk assessments provide the basis upon which to consider current requirements for improved flood defense, and to identify those assets at the greatest risk.

1.6.3 Human Asset Scoring Criteria

Alongside the appraisals of flooding risk, an assessment of the relative importance of each Concentrated and Distributed Asset grouping has been made using consistent scoring systems. The scoring is not used to prioritize or rank locations; however, it does help us to discern the relative importance of the flooding risks described above. The following sections describe the basis of the scoring systems used.

1.6.3.1 Concentrated Assets Scoring (Table 2 in each PU chapter)

The scoring of Concentrated Asset groupings is based upon an assessment of the nature and extent of the assets present. A score out of 100 is given for each grouping based upon the following features:

Residences	25
Industry	20
Infrastructure	15
Institutional and Publicly Owned Facilities	15
Strategic Resources	25
Maximum Score	100

A table presenting the ‘Concentrated Assets Scoring’ is provided for each Planning Unit.

The individual scores for each of these features are based on set definitions, as set out below. These scores allow comparison of significance across the coast.

i Residences

This category represents the extent of residences (houses, apartments, etc) present in the grouping. This is taken as an indicator of community size, which is a governing factor for determining the appropriate level of coastal protection. The probability for catastrophic disaster in terms of human life and infrastructure is commensurate with population and tax base required to support a high level of hurricane protection.

The score (out of 25) for residences is based upon the total number of housing units within the grouping (taken from census data). No strict scoring rationale are defined, rather a consistent, relative approach has been used. Typical examples of the scores given, for a range of communities on the Louisiana coast, are given below:

- New Orleans – 25
- Lake Charles – 20
- Houma – 17
- Thibodaux or Morgan City – 15
- Franklin or New Iberia – 12
- Jeanerette – 8
- Delcambre - 5

ii Industries

The industry category represents the economic status of the asset grouping and includes:

- Oil & gas infrastructure (excluding refineries)
- Agricultural land and buildings
- Fishing and Hunting
- Construction, Manufacturing and Fabrication
- Commercial Industry (wholesale and retail)
- Professional Services
- Hotel, Restaurant and Tourism
- Public Services

As with residences, no strict scoring rationale was defined; however, the Industry score (out of 20) was based upon the importance of the industries present, in terms of their:

- Employment – number of direct employees
- Criticality to recovery
- Environmental consequences
- National significance
- State significance
- Local significance

iii Infrastructure

The infrastructure category is used to represent the local infrastructure critical to the well-being and economy of the local population. This category includes:

- Forced drainage levees
- Highways, roads and bridges
- Internal pump stations
- Navigation Channels
- Pipelines
- Ports
- Railroads
- Schools
- State/Federal Research Facilities
- Waterlines

No strict scoring rationale was defined; however, the Infrastructure score (out of 15) was based upon the importance of the assets present, in terms of their:

- National significance
- State significance
- Local significance
- Criticality to Recovery

iv Institutional and Publicly-Owned Facilities

This category is used to represent the local support facilities, which are vital to concentrated asset areas. This category includes:

- Military bases
- Penal institutions
- Police stations
- Sheriff's Department
- State and Local Government facilities
- Universities/Community Colleges
- EMS Stations
- Fire Stations
- Heliports
- Hospitals

Because institutional and publicly owned facilities can also be classified as infrastructure, the same criteria and ranking system as used for infrastructure was used to rank the facilities in this section. Thus the score (out of 15) is based upon:

- National significance
- State significance
- Local significance
- Criticality to Recovery

v Strategic Resources

The Strategic Resources category represents nationally important assets and features critical to the recovery of the area after a major storm. This category includes:

- Major Pump Stations
- Major Strategic ports
- Evacuation Highways
- Telecommunications towers and stations
- Wastewater treatment plants
- Airports (Civilian and Military)
- Drinking Water Plants
- Henry Hub
- LOOP
- Refineries

No strict scoring rationale was defined; however, the Strategic Resources score (out of 25) was based upon the same criteria as the above two feature groups, namely:

- National significance
- State significance

- Local significance
- Criticality to Recovery

1.6.3.2 Distributed Assets Scoring (Tables 4 and 5 in each PU chapter)

The scoring of Distributed Asset groupings is based upon an assessment of the nature and extent of the assets present. The assets included in these groupings are specific to each Planning Unit, and presented under the following headings:

- Oil & Gas Fields
- Oil & Gas Pipelines
- Highway, Bridges & Transportation
- Evacuation Routes
- Ports, Waterway & Infrastructure
- Other Strategic Assets

A score out of 100 is given for each grouping based upon the importance of these assets under the following criteria:

National Significance	25
State Significance	25
Local Significance	25
Critical to Recovery	25
Maximum Score	100

A table presenting the ‘Distributed Assets Scoring’ and another identifying the Distributed Assets present within each grouping are provided for each Planning Unit.

The scores are based on a set of definitions, as set out below.

i National Significance.

The first component of the Distributed Assets Scoring System is ‘National Significance’. This criterion is given a maximum weight of 25 points. National Significance describes the value of strategic resources on the Nation’s people, economy, environment, and homeland security. This criterion provides an indicator of the value of strategic resources to the Nation.

ii State Significance.

‘State Significance’ is the second criterion of the Distributed Assets Scoring System. State Significance, weighted with a maximum of 25 points, describes the value of strategic resources (by planning unit) to the State’s people, economy, environment and homeland security.

iii Local Significance.

The third criterion, ‘Local Significance’, represents the value of strategic resources to the local people, economy, environment as well as local homeland security.

iv Critical to Recovery.

The final criterion in the Distributed Assets Scoring System is ‘Critical to Recovery’. This criterion represents how significant a particular resource is to the recovery of an area after a crisis or natural disaster. This criterion has been deemed very important to the functional value (i.e. importance) of infrastructure resources, thus infrastructure that is rated as more significant to an area’s recovery will have a greater “Critical to Recovery” score.

1.6.4 Natural Environment

To describe the problems within, and risks to, the natural environment, the planning units were first divided into subunits, referred to as ecosystem units, according to three decision points. The primary division was made according to vegetation types, based on Chabreck and Linscombe marsh type (Coastal Louisiana Vegetative Type Characterization Data, 2001) and the USGS Louisiana GAP imagery (Louisiana Gap Analysis Project, United States Geological Survey, 1998). Adjustments were then made according to locations of major landforms (e.g., ridges, major water bodies). Final adjustments were made to correlate with Coast 2050 mapping unit breaks whenever possible, to allow for greater ease in using information from the report. Note that the ecosystem units derived for this assessment usually encompassed multiple Coast 2050 mapping units. In cases where ecosystem subunits covered multiple Coast 2050 mapping units, averages of mapping unit information were used to fill out the tables.

1.6.4.1 Existing Conditions and Problems Identification Tables (Table 6 in each PU chapter)

The relative influence of major function disruptions on each of the ecosystem units was described in relative terms to provide an easily discernable description of the major process disruptions within any particular ecosystem unit. This is presented in a table for each Planning Unit. These tables are not intended to prioritize between ecosystem units, but only to understand the major drivers within a unit that should be addressed to increase landscape stability.

The major function disruptions that were considered are defined as follows:

i Subsidence

Rates were taken from figure 4-5 of the Coast 2050 report (Louisiana Coastal Wetlands Conservation and Restoration Task Force and the Wetlands Conservation and Restoration Authority, 1998). These were described in the report to reflect true subsidence, as benchmark elevations were not referenced to tide gauges. For the purposes of this exercise, the rates were classified as follows:

<i>No Impact</i>	0 feet/century
<i>Low</i>	0 – 1 feet/century
<i>Moderate</i>	1.1 – 2 feet/century
<i>High</i>	2.1 – 3.5 feet/century
<i>Very High</i>	>3.5 feet/century

ii Tidal Exchange

This category was used to describe the deleterious effects of increased daily tidal energy exposure on wetlands. It was assumed that such energy is more harmful to historically fresh/intermediate wetlands, and less harmful – or even beneficial to – historically

brackish/saline wetlands. Thus, the wetland conversion information found in the Coast 2050 report was used to populate this portion of the table.

iii Sediment Disruptions

Disconnections from historic sources of sediment were captured in this category. This could include disruptions to direct connections to rivers or other waterways that historically nourished an area, or disruptions to riverine plumes that travel along the coast and serve as sediment sources for coastal shorelines.

iv Saltwater Intrusion

Causes of increased salinities to coastal wetlands are captured in this category. Causes include land retreat which allows encroachment of the Gulf of Mexico inland, saltwater movement up man-made canals and navigation channels, encroachment into natural water bodies because of decreased freshwater outflow, etc. Historic, present, and projected future habitat information found in the Coast 2050 report was used for this category, as well as maps showing extent of man-made canals and navigation channels.

v Altered Inundation

Altered frequency or duration of inundation that is not related to relative sea level rise (subsidence plus sea level rise), was described in this category. Such alterations generally included disconnections from freshwater sources and impoundments.

vi Wave/wake Energy

Causes of increases in wave/wake energy include expansion of lake diameters, which increases fetch, and boat/ship wakes within canals. Storm energy is also included in this category.

vii Direct Removal

This category is defined as dredging of wetlands or covering by spoil banks and levees. Generally, this category describes historic actions; however, some isolated areas of the coast continue to be subjected to direct removal, and such losses are incorporated.

1.6.5 Changes in Natural Resources, 1990-2050 (Table 7 in each PU chapter)

The natural resources at risk if no further action is taken to protect them were described in relative terms. Tables show risk of loss to major habitat types, as well as representative fish and wildlife species for each of those specific habitat types. This information was taken directly from the Coast 2050 report, without exception. Projected percent loss of the habitats was presented in the Coast 2050 report, but was converted to relative terms for this table. Translations to the relative terms are found in the "Wetland Key" on the tables. Projected losses of fish and wildlife species were presented in the Coast 2050 report in relative terms, and those relative terms were used in this table to the extent possible.

Loss of storm attenuation was also described in this table. This field was populated by considering the projected land loss in an ecosystem unit as well as the current capacity of that landmass to attenuate storm energy. The former was taken from the Coast 2050 report, but the latter was largely professional judgment. For example, although the projected land loss is high

for the Chandeleur Islands, it was determined that they are already so removed from the next closest land mass that their current ability to abate storm energy is relatively low. Therefore, the projected loss of storm attenuation was determined to be moderate. Conversely, projected high loss of the fringing marshes of planning unit 3a was considered to translate to high loss of storm attenuation capacity because of their proximity to the barrier islands as well as communities and infrastructure.

1.6.6 Future Risks to Human Assets

The changing climate and continuing loss of wetlands, ongoing subsidence, and increased frequency of storms, all serve to greatly increase the risk to coastal human assets. The ‘changes in natural resources’ identified from the tables described above, will form the basis for this assessment of future risks to human assets.

For the purpose of creating alternative plans, quantification of the future risk, or differentiation between the changes in risk between assets was not necessary. However, the assessment has identified where the future risk is likely to be similar to or greater than at present, or if the future natural resource changes or sea level rise will result in a step change in risks, i.e. loss of supporting landforms. All assumptions used in formulating alternative plans will be tested as these plans are modelled and assessed for their ability to meet coastwide objectives.

1.6.7 Objectives and Measures Tables

For each Planning Unit, a series of ‘Planning Unit Objectives’ have been defined based upon the risks to human and natural assets. These are set out in an ‘Objectives vs. Measures Table’ which sets out the planning unit objectives, the coastwide objectives they reflect, and possible measures to achieve them. Each table has seven main columns:

1. Identifies if the location defined covers ‘Concentrated Assets’, ‘Distributed Assets’ or ‘Natural Assets’.
2. Identifies the specific ‘Geographic Location’ under consideration.
3. Summarizes the current status of the human or natural assets in that location, as defined in the baseline understanding.
4. Summarizes the future risks and impacts to assets under the base plan.
5. Sets the specific objective(s) to address the future risks/impacts to the assets in that location.
6. Identifies the coastwide objective that the Planning Unit objective relates to.
7. List of Potential Measures to meet objectives.

1.7 PLAN FORMULATION RATIONALES

Two plan formulation rationales were developed for each planning unit based on all of the above discussed factors, criteria, rankings, and scores. In the first rationale, the strategy for selection of protection and restoration measures is summarised as follows:

‘Provides for maximum structural protection, without constraints by local (asset) benefit/costs. Landscape features will be created and sustained using mechanical means. Long-term O&M costs are not a constraint at this stage of plan formulation.’

Specifically, this rationale was applied using the following parameters:

1. Maximum hurricane protection for all communities where technically feasible (using judgment at this stage).
2. Minimize overall length of flood protection features regardless of primary wetland impacts (with regard to technical feasibility and maximizing efficiency). Projects will be designed to avoid, minimize, or mitigate primary wetland impacts of any alignment.
3. Ecosystem restoration projects or combinations maximize acres of wetlands and other coastal features in the near term (e.g. long distance pipeline of material for creation of land). Sustainability will be provided by mechanical methods.

In the second rationale, the strategy for selection of protection and restoration measures and alternatives is summarized as follows:

‘Provides for variable levels of structural protection with non-structural alternatives for protection (e.g. coastal restoration, evacuation planning, raising or relocating assets). Projects will reflect benefit/cost constraints and include self-sustaining environmental options. Long-term O&M costs will be minimized.’

Specifically, this rationale was applied using the following parameters:

1. Variable hurricane protection for all communities where feasible; level of protection defined by assessment of risk to the human economic assets (based on analyses of concentrated and distributed assets).
2. Minimize overall system impacts by minimizing flood protection project disruptions to wetland ecosystems (e.g. minimize acres of wetlands impounded, minimize constrictions to normal hydrologic exchange, maximize non-structural solutions, use natural landforms).
3. Ecosystem restoration projects or combinations ensure self-sustaining processes are restored (i.e. large-scale diversions to build and sustain wetlands, or combine marsh creation with smaller diversions to sustain wetlands).

1.8 ALTERNATIVE PLANS AND RECOMMENDATIONS

Alternative plans are based on the plan formulation process and the inputs provided during the Interdisciplinary Technical Team (ITT) workshop held on 1 May 2006. Based on comments from the ITT several priority measures were identified that held broad-based stakeholder support, were of significant and immediate need, and were in a location where limited solutions

existed to address a need. These were further discussed at a Strategic Design Team (SDT) workshop on 5 May 2006. Based on these discussions the list of priority measures was finalized for inclusion in the USACE Preliminary Technical report. The State of Louisiana and the USACE have discussed these recommendations, and are writing supporting documentation for each.

1.9 NEXT STEPS

Described above is the approach taken to begin assembling alternatives in an integrated coast wide planning framework to address hurricane protection, flood control, and ecosystem restoration, commensurate to risk of loss to developments and populations that are located in low lying areas vulnerable to storm damage. A partnership was formed between the State of Louisiana and the Corps of Engineers to conduct this initial alternative plan formulation process.

The alternative plans described in this document will be developed and optimized through an iterative process of continued formulation that is coupled with technical evaluations. Technical analyses will be performed to quantify the respective performance of alternatives in achieving coast wide objectives and address planning unit needs. These alternatives will also be evaluated on a life cycle basis to assess economic, social, and environmental benefits and impacts, as well as construction, operations, and maintenance and repair costs. During the plan development iteration, the alternative plans will be reformulated with public involvement with an aim of arriving at the plan that best meets the objectives.

A suite of technical evaluation tools and methods will be applied in evaluating the alternative plans. These include multi-dimensional hydrodynamic modeling to identify surge and wave reduction effects, as well as to assess drainage and hydrology requirements. Community habitat evaluation modeling procedures will be used to determine habitat outputs of individual project components; and ecologic modeling to determine systemic ecologic and hydrologic benefits and impacts. Finally, cost engineering methodology will be employed to estimate dollar values of building and sustaining plan features.

The range of measurements provided by these tools will be used to determine the optimal plan and component measure performance. An iterative formulation process will use the quantified modeling and assessment information to identify optimally performing measures and allow them to be reconfigured with similarly efficient and effective measures. This process may include the identification of high performing measures that were included in one but not all planning units. Such measures can then be reincorporated where appropriate in the overall plans.

This process may require a minimal amount of addition modeling and assessment, but will provide the most efficient application of resources to arrive at the solution to be advanced as the preferred alternative plan. The process will also allow points for continued coordination with stakeholders and the general public through the completion of the final report.

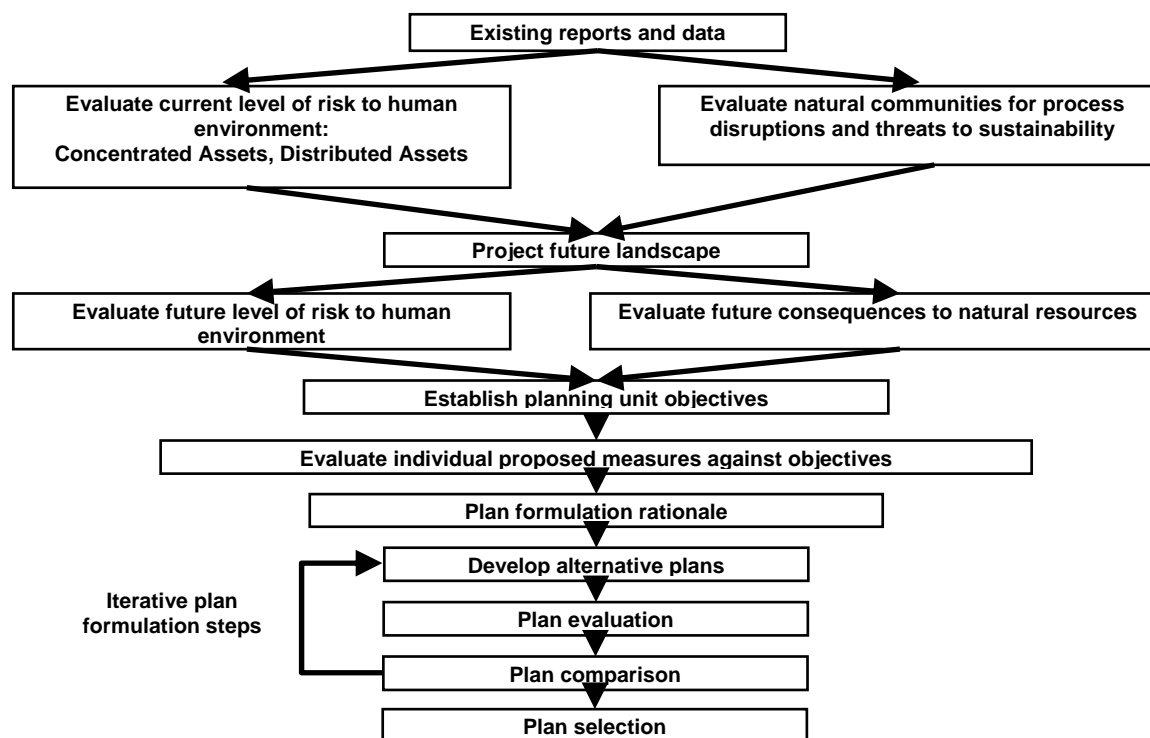


Figure 1.3: Scematic diagram illustrating next steps of plan reformulation, leading to selection of the preferred plan.

Table 1.1 Schedule for completion of Louisiana Comprehensive Coastal Protection Master Plan and USACE LaCPR Report.

Process	Completion Date
Plan Formulation	May 2006
Stakeholder Workshop	July 2006
Alternative Plans Evaluation	August 2006
Draft Alternative Plan and Documentation	October 2006
Draft Alternative Plan Evaluation	December 2006
Stakeholder Workshop	January 2007
Louisiana Comprehensive Coastal Protection Master Plan	February 2007
USACE LaCPR Draft Final Technical Report	February 2007
USACE LaCPR Final Technical Report	December 2007

2 PLANNING UNIT 1: EAST OF THE MISSISSIPPI RIVER

2.1 OVERVIEW

Planning Unit 1 (PU 1), representing the entire Lake Pontchartrain Basin, is the most densely populated planning unit in Coastal Louisiana and stretches from the East Bank of the Mississippi River to the Mississippi State Line.

Located in PU 1 is a majority of the New Orleans Metropolitan Area (New Orleans) located east of the Mississippi River. New Orleans has unique heritage, including architectural and cultural resources, and it plays a major role within the world trade and tourism industries.

Within Planning Unit 1, three ports are of national significance: (1) The Port of South Louisiana, (2) the Port of New Orleans and (3) Port of Plaquemines. In addition, the region has many economic benefits due to its diverse infrastructure that provides jobs and is a substantial part of the life within the PU.

Besides the Mississippi River, the Gulf Intracoastal Waterway (GIWW) and the Mississippi River Gulf Outlet (MRGO) are major waterways which influence the economy in the region, but have also produced a negative impact on the region by directly removing otherwise healthy habitat, altering the natural hydrology and promoting saltwater intrusion into fresher habitat. Therefore, finding a long-term solution is a high priority. In addition, the numerous highly developed and diversified industrial and residential centers located throughout PU 1 have dramatically altered much of the natural environment.

The solution to the critical problems facing this planning unit must include flood protection structures and coastal landscape features that work together to ensure the long-term sustainability of the natural and human environment and at the same time recognizes the needs of the economy.

Compared to historic conditions, very little fresh water, nutrients, and sediment are being introduced into PU 1. Most remaining connections with fresh water are in the Lake Maurepas and North Shore areas where several bayous and rivers empty into Lake Pontchartrain. Additionally, the Caernarvon Diversion provides freshwater and nutrients into Upper Breton Marshes. Other system stressors include direct removal of habitat by dredging or burial; increased tidal amplitude into fresher, inland areas; accelerated shoreline erosion; and relative sea level rise. In combination these stressors serve to decrease habitat crucial to the productivity of commercially and recreationally important fish and wildlife species. Another crucial issue is the very rapid destruction of wetlands within the Lake Borgne vicinity, Breton Sound, Biloxi Marshes, Orleans Land Bridge, and Chandeleur Island Chain, which buffer New Orleans against storm surge.

Developing natural and man-made measures to ensure hurricane storm surge and flood protection is critical for a sustainable solution for the future. Reintroduction of sediments, nutrients, and fresh water from the Mississippi River into all areas of Planning Unit 1 is vital to the future of this region. Additionally, strengthening and maintaining the critical landmasses

between Lakes Maurepas and Pontchartrain, and Lakes Pontchartrain and Lake Borgne; and restoring and maintaining the Chandeleur Islands should be considered.

Both Alternative Plan 1 and Alternative Plan 2 must include completion or acceleration of the measures within the Louisiana Coastal Authority (LCA) near-term plan as follows:

- MRGO Environmental Restoration Features
- Small Diversion at Hope Canal
- Small Diversion at Convent/Blind River
- Increase Amite River Diversion Canal Influence by Gapping Banks
- Medium Diversion at Whites' Ditch
- Modification at Caernarvon Diversion
- Louisiana/Mississippi Hydrodynamic Study
- Mississippi River Hydrodynamic Study
- Mississippi River Delta Management Study

2.2 ALTERNATIVE PLAN ONE

To provide the maximum structural protection for PU 1, Alternative Plan One comprises the USACE Levee Alignment 1, with an alternative alignment (East Levee Alignment 6) on the eastern end along the GIWW. Alignment 1 includes the Hurricane Barrier Plan and a Ring-levee around Plaquemine Eastbank along the Mississippi River.

The Hurricane Barrier Plan provides a levee protection system for a 30-ft storm surge at the coastline. It originates on the north shore of Lake Pontchartrain in Slidell, LA, and extends across the land bridge between Lake Pontchartrain and Lake Borgne. The system continues around the Lake Borgne shoreline to the vicinity of the existing Bayou Dupre structure. From that point, it coincides with the existing levee system around St. Bernard Parish and terminates at the Mississippi River Levee. It includes major structures at Rigolets Pass, Chef Menteur Pass, the GIWW, and the MRGO. It also includes structures and pumping stations at the outfalls of the 17th Street Canal, Orleans Avenue Canal, London Avenue Canal, and the Seabrook flood gate at the INHC. These structures would keep surges generated solely in Lake Pontchartrain from moving up these canals. The re-evaluated levee protection along the south shore of Lake Pontchartrain, which will continue along US Highway 11 (through Bayou Sauvage National Wildlife Refuge) and tie-into Alignment 1 and Chef Menteur Pass, will protect to the level needed for surges generated within Lake Pontchartrain.

Therefore, Levee Alignment 1, in combination with the south shore levee, would provide a maximum structural level of protection for New Orleans, North Shore and communities throughout the Lake Pontchartrain Basin, including the Plaquemine Eastbank.

Coastal restoration measures chosen for this alternative are significant landscape features, such as Barrier Island, Southern Biloxi Marsh Landbridge, and Lake Borgne Landbridge restoration. These measures have broad stakeholder support and enhance hurricane protection and ecosystem protection function.

A post-authorization change for the MRGO to exclude deep draft navigation, to include environmental restoration features is a major need in this planning unit. Due to the negative impacts of the MRGO to flood protection, as experienced during last years hurricane season, this has to be addressed within any alternative chosen.

Sediment delivery via pipeline was chosen in various locations (LaBranche Wetlands, Central Wetlands, Golden Triangle, and American/ California Bay) as an immediate solution to enhance and restore critical wetlands that are sediment deprived, fragmented and/or deteriorated from saltwater intrusion and wave/wake impacts. The diversion at Benneys Bay also fulfills the goal of wetland restoration and the design is 30 percent complete under CWPPRA funding (CWPPRA Project No. PPL 10). These measures offer an implementable solution within the delta region.

Ridge restoration is an important feature in the goal of enhancing natural landscapes, habitats and natural hydrology, which is defined as coastwide objectives. The Bayou La Loutre Ridge and Main Pass Ridge are recommended projects, both being well supported by stakeholders. The Main Pass Ridge project provides synergy with the chosen Benneys Bay diversion and marsh creation project.

All of the LCA near-term plan measures are included in Alternative Plan One.

Besides hurricane protection and coastal restoration features, it is necessary to implement a strategic plan to elevate and/or relocate assets located outside the hurricane protection plans. This effort, in combination with the described features above, will provide a holistic approach to coastal protection as defined in Act 8.

2.3 ALTERNATIVE PLAN TWO

For Planning Unit 1 Alternative Plan Two comprises the USACE Levee Alignment 1, with a lesser protection level from Caernarvon to Point a la Hache (20 ft storm surge at coastline) and no structures at the Rigolets Pass and Chef Menteur Pass. The existing levee along the south shore of Lake Pontchartrain will still be tied into Alignment 1 at Chef Menteur Pass and will be upgraded to the protection level determined from modeling results of the Hurricane Barrier Plan (without the Rigolets floodgate). This system would provide a maximum structural level of protection to the densely populated regions of the New Orleans and North Shore, which incorporate many concentrated assets, while offering a feasible protection to other areas.

Coastal restoration features chosen for this Alternative Plan provide a basis for a sustainable ecosystem while providing the most possible natural protection for the region. All recommended features have broad stakeholder acceptance.

Barrier islands provide the first line of defense against storm surge from the Gulf of Mexico and coastal stakeholders have long supported barrier island restoration as a coastal protection need. As well as offering storm surge reduction and retarding saltwater intrusions barrier islands serve valuable ecosystem functions and offer unique habitat.

A post-authorization change for the MRGO to exclude deep draft navigation, to include environmental restoration features is a major need in this planning unit. Due to the negative impacts of the MRGO to flood protection, as experienced during last years hurricane season, this needs to be addressed within any alternative chosen.

The Marshes within the Breton Sound, the Biloxi and Lake Borgne Landbridges have suffered from saltwater intrusion and have deteriorated over time due to limited freshwater introduction to these marshes. Subsidence and wave energy have also caused habitat degradation and loss. The past hurricane season accelerated the loss of these critical marsh habitats. There is consensus among coastal experts and the general public to protect these particular habitats due to their proximity to flood protection features and inhabited communities and their storm attenuation abilities. The marshes are also a substantial part of the livelihood of many residents in the vicinity.

To restore historic hydrologic conditions, target salinity gradients, and to nourish deteriorating marsh habitats and landbridges, several diversions/reintroductions (Convent/Blind River, Hope Canal, Violet, Caernarvon, American/California Bay, and Benneys Bay) of various magnitudes are integrated in this rational. The Caernarvon and American/California Bay diversions will also provide sediments to the deprived Breton Landbridge and Fringing Marsh area south of Point a la Hache. The Benneys Bay sediment diversion enhances the area between Baptiste Colette Pass and Main Pass within the delta region with needed sediments from the Mississippi River.

All of the LCA near-term plan measures are included in Alternative Plan Two.

Besides hurricane protection and coastal restoration features, it will also be necessary to implement a strategic plan to elevate and/or relocate assets located outside the hurricane protection plans. This effort, in combination with the described features above, will provide a holistic and sustainable approach to coastal protection as defined in Act 8.

2.4 SUPPORTING DOCUMENTATION

Supporting documentation for Planning Unit 1 Alternative Plan formulation includes the following:

Figure 2.1	Boundary and Base Map
Figure 2.2	Concentrated and Distributed Assets Map
Table 2.1	Relative Damage from Storm Surge for Concentrated Assets
Table 2.2	Concentrated Assets Scoring
Table 2.3	Relative Damage from Storm Surge for Distributed Assets
Table 2.4	Distributed Assets Scoring
Table 2.5	Distributed Assets Identification
Table 2.6	Existing Conditions and Problem Identification Table
Table 2.7	Changes in Natural Resources, 1990-2050 Table
Figure 2.3	Ecosystem Units and Natural Resources Map

Table 2.8a	Objectives and Measures Table - Concentrated Assets
Table 2.8b	Objectives and Measures Table - Distributed Assets
Table 2.8c	Objectives and Measures Table – Ecosystem Units
Figure 2.4	Alternative One Map
Figure 2.5	Alternative Two Map

3 PLANNING UNIT 2: MISSISSIPPI RIVER TO BAYOU LAFOURCHE

3.1 OVERVIEW

Planning Unit 2 (PU 2) is a triangular shaped area bounded by the Mississippi River, Bayou Lafourche, and the Gulf of Mexico. This highly productive estuary is home to a vast human population, where the social and economic cultures have evolved around and are dependent upon the estuary's natural resources. However, man's habitation of this dynamic environment has lead to landscape changes that threaten the sustainability of both the natural and human environment.

Freshwater and sediment input to PU 2 was virtually eliminated by the erection of flood protection levees along the Mississippi River and the closure of Bayou Lafourche at Donaldsonville. The lack of fresh water, and the loss of the accompanying sediments, nutrients, and hydrologic influence, forms the most critical ecological problem of the Barataria Basin. The second critical problem is the erosion of the barrier island chain. As individual islands are reshaped or breached, passes widen and deepen, allowing the Gulf of Mexico greater influence on interior wetlands.

The life and livelihood of the human population located in PU 2 requires protection from river flooding and gulf storm surge. The major Mississippi river ports, noted in Planning Unit 1 on the east of the river, have infrastructure on the west bank and thus effectively operate from both banks of the river. Thus, the solution to the critical problems facing this planning unit include flood protection structures and coastal landscape features that work together to ensure the long-term sustainability of the natural and human environment. This type of synergy can be accomplished by restoring critical landscape features at strategic locations selected for their ability to protect human infrastructure and restore ecological processes. Reintroduction of sediments, nutrients and freshwater from the Mississippi River and restoring the barrier island chain are paramount to achieving long-term sustainability.

Accordingly, analysis of current condition and future long-term sustainability requires that sediment now being lost off the continental shelf be redirected to nourish and establish marsh. To accomplish this goal will require compatibility with navigation's current and future needs. The overall goal should be to maximize the use of available sediment for habitat creation and ultimately surge protection.

Both Alternative Plan 1 and Alternative Plan 2 must include completion or acceleration of the measures within the Louisiana Coastal Authority (LCA) near-term plan as follows:

- Barataria Basin barrier Shoreline Restoration (Caminada Headland and Shell Island)
- Small Bayou Lafourche Reintroduction
- Medium Diversion with Dedicated Dredging at Myrtle Grove
- Re-authorization of Davis Pond – Optimize for Marsh Creation
- Louisiana/Mississippi Hydrodynamic Study

- Mississippi River Hydrodynamic Study
- Mississippi River Delta Management Study

3.2 ALTERNATIVE PLAN ONE

For PU 2, the maximum structural protection will be given by the USACE Levee Alignment 1, Mississippi River to LaRose reach. This alignment is the same as the Donaldsonville to the Gulf, Modified Gulf Intracoastal Waterway (GIWW) alignment. The proposed hurricane protection would be constructed on the gulf side of the waterway to keep tidal surges from entering the waterway and progressing into the protected side of the Barataria Basin. The hurricane barrier, which would protect against a 30-ft. storm surge at the coastline, would start near the Mississippi River south of Belle Chasse in Plaquemine parish and extend to, and include improvements to, the existing Larose to Golden Meadow levee in Lafourche Parish. To provide additional protection to other consolidated assets, the alignment would be modified to include the communities of Jean Lafitte and Barataria. Other structural protection proposed in this rationale include: improving existing levees in the City Price to Venice segment of the New Orleans to Venice Hurricane Protection Project to provide 100 year storm frequency level of protection; and, providing the maximum technically feasible protection for assets on Grand Isle.

Metropolitan New Orleans includes a highly populated urban area on the west bank of the Mississippi River. This area includes parts of Plaquemine, Orleans and Jefferson Parishes. The West Bank and Vicinity Hurricane Protection project, which provides Standard Project Hurricane level of protection, is authorized to protect this area, and would serve as a second line of defense for the area of highest concentrated assets.

Therefore, the modified GIWW levee alignment in combination with the lower Plaquemine and Grand Isle protective measures would provide a maximum structural level of protection for populated areas in PU 2.

Coastal restoration measures chosen for this rationale were selected to provide the maximum level of protection to distributed assets and to enhance protection provided by structural protection features. Selected measures include: completing/accelerating the LCA study; restoring the Barataria shoreline and barrier islands from the Caminada Headlands to Sandy Point; adaptive management through maintenance of the West Bay crevasse; pipeline conveyance of sediment to create marsh at strategic locations, including along Louisiana Highway 1 and the back levees of Plaquemine and Lafourche Parishes; back filling and/or plugging non-essential oil and gas canals; development of a watershed management plan to optimize flood protection and habitat restoration; small diversions at strategic locations in the upper basin; maximizing beneficial use of dredge material where feasible; and, strategizing and implementing a plan to elevate and/or relocate assets located outside the hurricane protection plans.

Restoration of the barrier island chain is a major need in this planning unit and has to be addressed within any alternative chosen due to the critical need to protect distributed assets such as Port Fouchon, the Loop distribution system, navigation and evacuation routes, and other oil and gas infrastructure. Besides directly protecting the distributed assets mentioned above, the barrier islands serve as the first line of defense against storm surge for population centers and

concentrated assets of the Barataria Basin. In addition, barrier islands provide essential habitat to critical fish and wildlife species. Without immediate restoration measures to sustain the barrier island chain, Barataria Bay will be absorbed by the Gulf of Mexico, causing irreparable damage to the Barataria Estuary.

Sediment delivery via pipeline was chosen in various locations as an immediate solution to enhance and restore critical wetlands that are sediment deprived, fragmented and/or deteriorated from saltwater intrusion and wave/wake impacts. Immediate sediment input is needed, particularly in the fringe marsh area along the back levees of Plaquemine and Lafourche Parishes and along the Barataria land bridge in Jefferson Parish. The small diversion with sediment enrichment proposed at Myrtle Grove would provide freshwater, nutrients and sediment to nourish and sustain marsh. Adaptive management of the West Bay crevasses south of Venice would provide for additional marsh creation.

Barataria basin is experiencing the highest rate of land loss of any area of Louisiana. An influx of freshwater, nutrients and sediments is needed to sustain this highly productive ecosystem. Optimizing flow from Davis Pond, adding small diversion along the river in the upper basin at strategic locations and back filing and/or plugging oil and gas canals will go along way toward achieving a sustainable estuary. Development of a storm water management plan would allow an integrated approach to water management that would prevent conflicts between flood protection and habitat restoration.

Besides hurricane protection and coastal restoration features, it will also be necessary to implement a strategic plan to elevate and/or relocate assets located outside the hurricane protection plans. This effort, in combination with the described features above, will provide a holistic approach to coastal protection as defined in Act 8.

3.3 ALTERNATIVE PLAN TWO

PU 2 consists of the New Orleans Metropolitan area on the west bank and other assets located within the Barataria Basin. The highly populated urban area on the west bank includes parts of Plaquemines, Orleans and Jefferson Parishes. The West Bank and Vicinity Hurricane Protection project, which provides Standard Project Hurricane level of protection, is authorized to protect this area from Davis Pond on the west to Oakville below Belle Chasse on the east. Upgrading the existing hurricane protection project to a levee system averaging 30 feet in elevation would offer the maximum level of protection to the metropolitan area on the west bank.

The USACE Levee Alignment 3 is proposed to provide to provide 100-year storm frequency level of protection to other populated areas of PU 2. This alignment is the same as the Donaldsonville to the Gulf, Highway 90 Levee Alignment, which extends from Golden Meadow to the Davis Pond guide levee. The levee segment along Highway 90 would be constructed on the gulf side of the highway and would connect with the existing Golden Meadow to Larose hurricane protection project to the west.

Other structural protection proposed in this rationale include: improving existing levees in the City Price to Venice segment of the New Orleans to Venice Hurricane Protection Project to

provide 100 year storm frequency level of protection; and, improving the ring levees around Lafitte, Barataria and Crown Point to provide the maximum technically feasible protection.

The variable structural protection described above would provide the maximum level of protection to the highly developed urban area, while offering a feasible protection to areas comprising less concentrated assets.

Coastal restoration measures chosen for this rationale were selected to provide the maximum level of protection to distributed assets and to enhance protection provided by structural protection features. Selected measures include: completing/accelerating the LCA study; restoring the Barataria shoreline and barrier islands from the Caminada Headlands to Sandy Point; adaptive management through maintenance of the West Bay crevasse; pipeline conveyance of sediment to create marsh at strategic locations, including along Louisiana Highway 1 and the back levees of Plaquemine and Lafourche Parishes; back filling and/or plugging non-essential oil and gas canals; development of a watershed management plan to optimize flood protection and habitat restoration; small diversions at strategic locations in the upper basin; maximizing beneficial use of dredge material where feasible; small diversion in the vicinity of Port Sulphur; restoring ridges; constructing a wave break along the northern shoreline of Barataria Bay; and, strategizing and implementing a plan to elevate and/or relocate assets located outside the hurricane protection plans. The synergism of the non-structural coastal restoration features chosen for this rationale provide a basis for a sustainable ecosystem while enhancing storm attenuation and providing the greatest possible natural protection for the region.

Restoration of the barrier island chain is a major need in this planning unit and has to be addressed within any alternative chosen due to the critical need to protect distributed assets such as Port Fouchon, the Loop distribution system, navigation and evacuation routes, and other oil and gas infrastructure. Besides directly protecting the distributed assets mentioned above, the barrier islands serve as the first line of defense against storm surge for population centers and concentrated assets of the Barataria Basin. In addition, barrier islands provide essential habitat to critical fish and wildlife species. Without immediate restoration measures to sustain the barrier island chain, Barataria Bay will be absorbed by the Gulf of Mexico, causing irreparable damage to the Barataria Estuary.

Sediment delivery via pipeline was chosen in various locations as an immediate solution to enhance and restore critical wetlands that are sediment deprived, fragmented and/or deteriorated from saltwater intrusion and wave/wake impacts. Immediate sediment input is needed, particularly in the fringe marsh area along the back levees of Plaquemine and Lafourche Parishes and along the Barataria land bridge in Jefferson Parish. The small diversion with sediment enrichment proposed at Myrtle Grove would provide freshwater, nutrients and sediment to nourish and sustain marsh. To provide a framework for marsh created via sediment delivery, key ridges throughout the basin would be restored.

A wave break along the northern rim of the Barataria Bay would serve as a second line of defense to augment the wave height attenuation function of the barrier islands and would also help to retain sediment within the basin.

Relocating the Mississippi River sediment distributary system out of the deep draft navigation channel is needed to prevent loss of sediment off the continental shelf and to provide long-term sustainability and create new marsh in the lower basin. Diverting freshwater, nutrients and sediments from the river is also needed in the upper and middle basin. However, navigation and flood protection needs must be maintained. Therefore, completing the studies recommended in the LCA plan will provide the necessary data needed to develop technically feasible solutions.

Barataria basin is experiencing the highest rate of land loss of any area of Louisiana. An influx of freshwater, nutrients and sediments is needed to sustain this highly productive ecosystem. Optimizing flow from Davis Pond, adding small diversion along the river in the upper basin at strategic locations and back filing and/or plugging oil and gas canals will go along way toward achieving a sustainable estuary. Development of a storm water management plan would allow an integrated approach to water management that would prevent conflicts between flood protection and habitat restoration.

Besides hurricane protection and coastal restoration features, it will also be necessary to implement a strategic plan to elevate and/or relocate assets located outside the hurricane protection plans. This effort, in combination with the described features above, will provide a holistic approach to coastal protection as defined in Act 8.

3.4 SUPPORTING DOCUMENTATION

Supporting documentation for Planning Unit 2 Alternative Plan formulation includes the following:

Figure 3.1	Boundary and Base Map
Figure 3.2	Concentrated and Distributed Assets Map
Table 3.1	Relative Damage from Storm Surge for Concentrated Assets
Table 3.2	Concentrated Assets Scoring
Table 3.3	Relative Damage from Storm Surge for Distributed Assets
Table 3.4	Distributed Assets Scoring
Table 3.5	Distributed Assets Identification
Table 3.6	Existing Conditions and Problem Identification Table
Table 3.7	Changes in Natural Resources, 1990-2050 Table
Figure 3.3	Ecosystem Units and Natural Resources Map
Table 3.8a	Objectives and Measures Table - Concentrated Assets
Table 3.8b	Objectives and Measures Table - Distributed Assets
Table 3.8c	Objectives and Measures Table – Ecosystem Units
Figure 3.4	Alternative One Map
Figure 3.5	Alternative Two Map

4 PLANNING UNIT 3A: BAYOU LAFOURCHE TO BAYOU DE WEST

4.1 OVERVIEW

Planning Unit 3a (PU 3a) consists of Terrebonne, St. Mary (east bank), Lafourche (west bank), Assumption (west bank), and St. Martin (east bank) Parishes, and is made up of the Verret, Fields, East Penchant, and Timbalier sub-basins. The concentrated assets, consisting of the communities and related assets in and around Houma, Thibodaux, and Morgan City, are increasingly facing threats from hurricane storm surges and flood events. The distributed assets, consisting of oil and gas infrastructure, marinas, and port facilities, and the concentrated assets are vulnerable to destructive storm surges without coastal protection features in place.

This planning unit has lost more than 200,000 acres of marsh since the 1930s. High natural subsidence combined with construction of navigation and oil and gas canals allowed large scale increases in tidal exchange and inundation, resulting in high rates of wetlands loss. In the lower areas of the Timbalier sub-basin, the barrier islands have severely eroded with many of the islands almost submerged.

Wetland losses in the East Penchant basin are substantial, but less than in the Timbalier sub-basin. Stressors that have impacted the East Penchant are salt water intrusion, and subsidence, which are aggravated by landscape modifications such as construction of the Houma Navigation Canal and the GIWW, and oil and gas activities. Combined, these activities have caused substantial hydrologic changes to the basin. Impediments to natural distribution and retention of sediments and freshwater have caused significant problems and severely reduce fresh water movement to the eastern Terrebonne wetlands.

Losses in the Verret sub-basin are minor in comparison to Penchant East, Fields and Timbalier sub-basins. Losses in the Fields sub-basin are primarily the result of land use changes and hydrologic isolation from sources of freshwater, nutrients, and sediments. Past rates of marsh loss have been fairly steady, but are small in comparison to Timbalier and East Penchant basins. Adverse impacts on remaining wetlands appear to be minor and relate to matters such as impoundment and shoreline erosion. Salt water intrusion impacts will increase as marshes to the south continue to convert to open water.

The future without further action in PU-3a is one of continued marsh loss. Without actions to correct the problems, another third of the basin's wetlands will be lost to open water by 2050. These wetland losses will result in the loss of critical breeding, nesting, nursing, foraging, and over wintering habitat for commercially and recreationally important fish and wildlife species. The loss of this important buffer to coastal communities (concentrated assets) and distributed assets will result in substantial increase in damages caused by storms to these assets.

Solutions that integrate storm protection and coastal restoration to ensure long-term sustainability of this planning unit are needed. Implementation of coastal protection measures that reduce storm damages to the communities and associated assets, minimize exposure of structural flood protection measures, restore and sustain wetland ecosystems, and flood

protection measures are needed not only to reverse the present loss rates, but to sustain and increase valuable natural assets, as well as to preserve the culture and the way of life of the residents of Louisiana.

Both Alternative Plan 1 and Alternative Plan 2 must include completion or acceleration of the measures within the Louisiana Coastal Authority (LCA) near-term plan as follows:

- Small Bayou Lafourche Reintroduction
- Multi-purpose operation of Houma Navigation Canal (HNC) Lock
- Terrebonne Basin Barrier shoreline restoration
- Maintain Land Bridge between Caillou Lake and Gulf of Mexico
- Convey Atchafalaya River Water to Northern Terrebonne Marshes
- Third Delta Study
- Upper Atchafalaya Basin Study

4.2 ALTERNATIVE PLAN ONE

Structural protection in Alternative Plan One is the Morganza to the Gulf Hurricane Protection levee alignment increased to provide protection for a 30-ft storm surge at the coastline. In addition, non-structural protection measures are proposed to provide the maximum level of protection to concentrated and distributed assets. Selected measures include completing/accelerating the LCA study, which includes: Small Bayou Lafourche reintroduction; multi-purpose operation of the Houma Navigation Canal (HNC); Terrebonne Basin shoreline restoration; maintaining the land bridge between Caillou Lake and the Gulf of Mexico and conveying Atchafalaya River water to Northern Terrebonne marshes. Additional measures include: marsh creation by sediment conveyance; plugging and/or backfilling oil and gas canals to restore hydrology and regulate salt water movement; providing bank line protection for the GIWW; maximizing beneficial use of dredge material where feasible; and introducing freshwater to nourish the newly created marsh platforms. Distributed assets are to be protected by elevating infrastructure and strategic relocation of assets. Freshwater conveyance from Atchafalaya River through existing waterways is an integral element of this alternative along with restoration and maintenance of bank lines of these waterways.

4.3 ALTERNATIVE PLAN TWO

Structural protection in this alternative plan would be provided by the Morganza to the Gulf Hurricane Protection alignment that provides 20-ft storm surge at the coastline protection along with an internal levee alignment that provides protection at 30-ft storm surge at the coastline for concentrated assets.

Coastal restoration measures chosen for this alternative were selected to provide protection to distributed assets and to enhance protection provided by structural protection features. Barrier island restoration is a non-structural measure that will provide the first line of defense. Pipeline conveyance of sediments is essential to create marsh platforms along fringing marshes. This marsh will be sustained by conveyance of freshwater, sediment, and nutrients from Atchafalaya River through the existing waterways. The bank lines of the existing waterways require

restoration for effective conveyance of water, sediment, and nutrients. These measures cannot be implemented unless the existing inundation and drainage concerns of Verret and Chacahoula Basins are addressed by implementing of the Chacahoula Basin Plan and/or other measures. The conveyance of the Atchafalaya River freshwater and sediment can be improved by utilizing the Houma Navigational Canal Lock System. The distributed assets are to be protected by providing well protected hurricane evacuation routes and other measures such as elevating infrastructures and strategic relocation of assets. Other coastal restoration measures proposed include: freshwater introduction via Blue Hammock Bayou; freshwater introduction to south Lake Decade; shoreline protection; stabilizing/maintaining the northern shoreline of Terrebonne/Timblie Bay; short-term freshwater redirections to nourish and sustain intermediate marshes that are being adversely affected by salt water; implementing the Penchant Basin Plan; protecting and maintaining ridges and maximizing the beneficial use of dredge material where feasible.

4.4 SUPPORTING DOCUMENTATION

Supporting documentation for Planning Unit 3a Alternative Plan formulation includes the following:

Figure 4.1	Boundary and Base Map
Figure 4.2	Concentrated and Distributed Assets Map
Table 4.1	Relative Damage from Storm Surge for Concentrated Assets
Table 4.2	Concentrated Assets Scoring
Table 4.3	Relative Damage from Storm Surge for Distributed Assets
Table 4.4	Distributed Assets Scoring
Table 4.5	Distributed Assets Identification
Table 4.6	Existing Conditions and Problem Identification Table
Table 4.7	Changes in Natural Resources, 1990-2050 Table
Figure 4.3	Ecosystem Units and Natural Resources Map
Table 4.8a	Objectives and Measures Table - Concentrated Assets
Table 4.8b	Objectives and Measures Table - Distributed Assets
Table 4.8c	Objectives and Measures Table – Ecosystem Units
Figure 4.4	Alternative One Map
Figure 4.5	Alternative Two Map

5 PLANNING UNIT 3B: BAYOU DE WEST TO FRESHWATER BAYOU

5.1 OVERVIEW

Planning Unit 3b (PU 3b) encompasses a majority of the West Penchant Sub-Basin in the Terrebonne Marshes, and the Atchafalaya and Teche-Vermilion Basins. The region extends from Bayou de West located west of Houma and south of Bay Junop, then westward to Freshwater Bayou. It extends north beyond the boundary of the coastal wetlands and includes Berwick, Patterson, Franklin, Jeanerette, New Iberia, Abbeville, Garden City, Sorrel, Louisa, Avery Island, Delcambre, Erath, Henry, Intracoastal City, and other communities. It covers all or part of Terrebonne, St. Mary, Iberia, and Vermilion Parishes.

There is a high to extremely high flood risk to concentrated assets from storm surges throughout the PU 3b, with future risk for increased flooding due to sea level rise, subsidence, and wetland loss. A similar picture exists for distributed assets such as oil and gas fields, facilities, and pipelines, as well as transportation infrastructure including hurricane evacuation routes.

Conditions of the ecosystem and natural resource vary throughout the Planning Unit. Unlike other areas of the coast, the Atchafalaya River and Wax Lake Outlet, deltas are prograding. However, other areas like the West Penchant Sub-Basin of Terrebonne Marshes and Vermilion and Cote Blanche Bays are subject to rapid erosion and subsidence rates. Subsidence is a factor throughout PU 3b, including the areas where delta building is occurring. Some areas such as Acadiana Bay and Wetlands are experiencing problems related to disconnection from riverine sediment sources. Other ecosystem units are experiencing varying levels of impact such as frequency and duration of inundation, wave, and/or wake energy which includes storm energy and sediment removal from dredging activities. Wetlands, fish and wildlife, and natural resources are experiencing varying levels of impacts ranging from no impact to high loss.

Restoring and sustaining the unique ecosystems of the West Penchant Sub-Basin, Atchafalaya River and Wax Lake Outlet, Teche-Vermilion Basin, and coastal shorelines, and historic barrier reefs are essential to providing for the livelihoods, culture, way of life, and infrastructure for the people of PU 3b. Solutions for the planning unit include providing coastal protection to communities as well as industry and infrastructure. Issues to address in this planning unit include utilizing sediment sources to combat area wide subsidence, reduce wave and wake energy impacts throughout PU 3b, reduce direct sediment removal, introduce sediments into areas of need and opportunity, encourage natural delta building, protect shorelines and rebuild barrier reefs, and maintain historic tidal exchange through Southwest Pass. The vision for the future for PU 3b depends upon the level of solutions and the measures within the alternatives adopted.

Both Alternative Plan 1 and Alternative Plan 2 must include completion or acceleration of the measures within the Louisiana Coastal Authority (LCA) near-term plan as follows:

- Stabilize the Gulf shoreline at Point Au Fer Island

- Convey Atchafalaya River water to northern Terrebonne marshes
- Acadiana Bays Estuarine Restoration Feasibility Study
- Upper Atchafalaya Basin Study

5.2 ALTERNATIVE PLAN ONE

The LCA short-term projects listed previously would be included in this alternative plan. The existing ring levee protection around Berwick and Patterson will be used to provide protection for a 30-ft surge elevation at the coast. For Planning Unit 3b, the maximum structural protection will be given by a recommended levee alignment (East Alignment Levee 3) that proceeds westward from Wax Lake Outlet along the south side of the GIWW to Freshwater Bayou. The recommended levee will provide for protection against a storm surge of 30 feet at the coast.

Coastal restoration measures chosen for this rationale were selected to provide the maximum level of protection to distributed assets. Selected measures include: creating and/or maintaining marsh and wetlands in the Acadiana Bays, Marsh Island, Rainey Marsh, and other areas; rebuilding historic reefs; utilizing to extend possible beneficial uses of dredged material and dedicated dredging to restore shoreline; and utilizing detached breakwaters where practical. Specific features for this plan include two LCA near-term projects to stabilize the Gulf shoreline at Point Au Fer Island and an effort to convey Atchafalaya River water to northern Terrebonne marshes. Other features included establishing a buffer marsh at Weeks Bay; providing wide-spread shoreline restoration along many miles of shoreline in Vermillion Bay and West Cote Blanche Bays; and constructing bank stabilization along Freshwater Bayou (Belle Island to Freshwater Lock). Beneficial uses of dredged material (Atchafalaya Bay) and dedicated dredging wherever possible to rebuild or nourish marsh should also be a key feature. Another proposed measure is to create an artificial reef complex extending from Point Chevreuil south-westward toward Marsh Island to serve as a storm surge barrier to East and West Cote Blanche Bay and Vermilion Bay.

5.3 ALTERNATIVE PLAN TWO

Several of the proposed features will be included in Alternative Plan Two. The LCA short-term projects listed previously would be included in this alternative. For this alternative plan the recommended protection includes a levee alignment from Wax Lake Outlet to the Vermillion River following the USACE West Levee Alignment 3. The level of surge protection for the ring levee around Berwick and Patterson would be the same as Alternative Plan One. The level of protection for the Wax Lake Outlet to Vermilion River alignment is also recommended to be for a 30-ft storm surge at the coastline. Because this levee alignment is further inland than that proposed in Alternative Plan One, the levee height should be lower and the foundation conditions should be better.

Specific features include protection levee alignment that is located inland from the coastline. The alignment follows the interface between the low marsh ground level and the edge of the higher natural levee formations along Bayou Teche. The 30-ft surge at the coast is the same as in Alternative Plan One but, due to inland location, the surge at the proposed levee height would be less than in Alternative Plan One.

The restoration features includes: a feature to increase sediment discharge through Wax Lake Outlet, that should be beneficial to slow shoreline losses as well as for marsh nourishment in many places; shoreline restoration in Vermillion Bay and West Cote Blanche Bays that is still considered to be a critical feature in both Alternative Plans. Another important feature in Alternative Two is stabilization of the bank lines along the GIWW throughout the planning unit. There is a desire to move fresh water and sediment in the GIWW from Wax Lake Outlet to the west, but there is significant leakage out the GIWW, seriously impacting the magnitude of water and sediment that arrives in the western region of PU 3b and PU 4. Southwest Pass between Marsh Island and Rainey Marsh has increased in width and thus conveys more salt water into Vermilion Bay. A feature to prevent further widening and some contraction is included.

5.4 SUPPORTING DOCUMENTATION

Supporting documentation for Planning Unit 3b Alternative Plan formulation includes the following:

Figure 5.1	Boundary and Base Map
Figure 5.2	Concentrated and Distributed Assets Map
Table 5.1	Relative Damage from Storm Surge for Concentrated Assets
Table 5.2	Concentrated Assets Scoring
Table 5.3	Relative Damage from Storm Surge for Distributed Assets
Table 5.4	Distributed Assets Scoring
Table 5.5	Distributed Assets Identification
Table 5.6	Existing Conditions and Problem Identification Table
Table 5.7	Changes in Natural Resources, 1990-2050 Table
Figure 5.3	Ecosystem Units and Natural Resources Map
Table 5.8a	Objectives and Measures Table - Concentrated Assets
Table 5.8b	Objectives and Measures Table - Distributed Assets
Table 5.8c	Objectives and Measures Table – Ecosystem Units
Figure 5.4	Alternative One Map
Figure 5.5	Alternative Two Map

6 PLANNING UNIT 4: FRESHWATER BAYOU TO SABINE RIVER

6.1 OVERVIEW

Planning Unit 4 (PU 4) extends from the western bank of the Freshwater Bayou Canal westward to the Louisiana/Texas border in Sabine Lake, and from the Gulf of Mexico in the south to the northern boundary established areas that are subject to storm or tidal surge. The Unit includes all or parts of Vermilion, Cameron, Acadia, Jefferson Davis, and Calcasieu parishes. The Chenier Plain extends from Freshwater Bayou westward to Sabine Pass, and is influenced by three interconnected rivers and marine processes. There are two major hydrologic basins in the Cheniers: the Mermentau Basin and the Calcasieu/Sabine Basin.

The Sabine/Neches Waterway, Calcasieu River Navigation Channel, the Gulf Intracoastal Waterway (GIWW), Mermentau Ship Channel, and Freshwater Bayou Canal are the navigation channels of the Chenier Plain, and all of them influence hydrology throughout the Planning Unit. Saltwater intrusion and wave and wind energy are the main forces driving salinity into freshwater marshes and causing deterioration of fresh marsh, which is not necessarily replaced by salt marsh but has remained as shallow open water.

Many of the wetlands in PU 4 are hydrologically isolated because of dredged canals and berms, roads and highways, the GIWW, and flood protection levees. During floods and large storm events, these areas can be slow to drain and create temporary ponds that can result in additional loss of wetlands due to drowning. Significant oil and gas facilities, chemical plants and other coast-related industries are located in the Lake Charles area, Lafayette, Hackberry, Vinton, and smaller communities. Agricultural land and cattle land are the primary land uses in much of PU 4. According to sources that are familiar with the region, this land was severely impacted by Hurricane Rita. Farmers are not able to plant crops on their land because of residual salt in the soil. The native vegetation, fish and wildlife in State Wildlife Management Areas and the National Wildlife Refuges have also been severely impacted by residual salt, causing death or degradation to almost all vegetation and freshwater ponds. In addition, coastal erosion is rampant along the entire shoreline of PU 4, and this is proliferating salt water intrusion. The detached off-shore breakwaters, protecting Highway 82 between Constance and Holly Beach, performed well through Hurricane Rita.

The planning, procedures and logic that was used to develop the rationale in this planning unit follows that described for the overall coast of Louisiana. It is discussed elsewhere in this report. The list of possible restoration projects was compiled from the following sources: USACE study for the Louisiana Coastal Authority (LCA), the Coastal 2050: Toward a Sustainable Coastal Louisiana report (2050), the Coastal Wetlands Planning, Protection and Restoration Act (CWPPRA), the Louisiana Coastal Protection Restoration study (LACPR), the Emergency Support Function 14 (ESF-14) report. These documents provided the understanding and information that was used to evaluate the current risk to the natural communities (fish, wildlife, aquatic habitat, terrestrial habitat, wetlands, beaches, and shorelines). No new studies were performed.

6.2 ALTERNATIVE PLAN ONE

Alternative Plan One provides levee protection to the maximum number of human communities. The protection and restoration objectives that are adopted for the Louisiana Comprehensive Coastal Protection Master Plan will be applied to the design of the levee to insure that it protects the natural resources as well. The existing coastal features are included in the design height of the levee, and they must be preserved to maintain the design parameters for the levee. This alternative was not constrained by the benefit to costs ratio. The long-term O&M costs were not included in the selection of features.

The result is the levee proposed by the USACE along the south side of the GIWW. The proposed levee height is adequate for a 30-ft high hurricane surge at the Coastline. The distance from this levee alignment to the open waters of the Gulf of Mexico varies from ten to twenty miles. Enhancing and maintaining a healthy terrestrial habitat in this area is one of the criteria applied to the design of the levee height. Promoting the beneficial use of sediment and obtaining sediment from sources outside of this planning unit are important for preserving marsh. Zoning and other measures are proposed for communities and assets south of the GIWW. Maintaining Louisiana Highways 27 and 82, and the other highways between the coast and I-10, for evacuation routes is an important measure in this plan.

The strategy in this alternative satisfies the expectation for a freshwater system in the Mermentau Basin. The measures include fresh water inflow from the Atchafalaya Basin, fresh water from the Sabine River, and fresh water from the Red River. The connection to the Red River source is via the Mermentau channel. The GIWW is used to distribute this fresh water to strategic locations across this planning unit. A new lock, constructed at the location of the existing Calcasieu Lock, will handle navigation requirements and regulate fresh water discharges simultaneously.

Landform and vegetation are important features for reducing surge heights. The Coast 2050 study concluded that future land loss in the Lakes Sub-basin could be reduced by 57 percent by managing the water levels. Fresh water control structures are proposed along Louisiana Highway 82; a water control structure is proposed at Little Pecan Island; and a water control structure is proposed at Rollover Bayou.

It is important to preserve the existing landforms between the levee and the Gulf of Mexico. The beach, coastline, cheniers and land bridge between Grand Lake and White Lake are important landscape features both for storm surge reduction and ecosystem function. Shoreline stabilization is proposed along the coast, and shoreline protection is proposed in Grand and White Lakes. Bank protection is proposed along the GIWW. The beneficial use of sediment and obtaining sediment from sources outside of this planning unit are important for preserving the marsh.

The strategy for the Calcasieu/Sabine Sub-basins deals with salinity issues. This alternative regards navigation as a given asset. It focuses on managing the salinity gradient by increasing the fresh water supply from sources outside of the planning unit and by controlling the connection between the Calcasieu Ship Channel and the Gulf of Mexico. Salinity control

structures are proposed around the lake, and a control structure is proposed across the Calcasieu near the existing ferry.

Ecosystem restoration projects that maximize acres of wetlands and provide other coastal features are proposed regardless of the sustaining nature of these features in the long term. That is, the use of long distance pipeline is proposed for delivering sediment rather than the construction of river diversions that provide a long-term solution.

6.3 ALTERNATIVE PLAN TWO

Alternative Plan Two proposes a variable level of hurricane protection based on the risk to concentrated assets and the risk to distributed asset. The rationale will compute the risk using the probability of a given surge height at the coastline and will evaluate the consequences using a rational developed for concentrated assets, distributed assets, and ecosystem assets.

This strategy provides ring levees for Lake Charles, Lafayette, Abbeville, Gueydan, Kaplan and Vinton. Protection for other communities will be provided by zoning, by building codes, by elevating assets above surge heights and by relocation. As in Alternative Plan One, maintaining Louisiana Highways 27 and 82, and the other highways between the coast and I-10, for evacuation routes is an important measure in this plan.

Grand and White Lakes will be managed as fresh water lakes. The strategy includes fresh water inflow from the Atchafalaya Basin via the GIWW. It utilizes the GIWW to distribute this fresh water to strategic locations across this planning unit. A new lock, constructed at the location of the existing Calcasieu Lock, will handle navigation requirements and regulate fresh water discharges simultaneously. It provides structures for passing flow at Louisiana Highway 82. The need to re-establish a normal hydrological exchange and to maximizing the use of alternatives that do not disrupt the overland flow of water are emphasized. Rather than seeking fresh water from the Red River basin, this strategy manages flows in the Mermentau basin to mimic historical flows by implementing the use of best management practices.

This strategy seeks to preserve natural landforms such as the beach, the coastline, cheniers and the land bridge between Grand Lake and White Lake. These are important landscape features both for storm surge reduction and ecosystem function. Shoreline stabilization is proposed along the coast, and shoreline protection is proposed in Grand and White Lakes. Bank protection is proposed along the GIWW.

The strategy for the Calcasieu/Sabine Sub-basins regards subsidence and sea level rise as primary concerns in long-term sustainability of the historical with salinity gradient. This alternative regards navigation as a given asset. The key difference between this alternative plan and Alternative Plan One is acknowledging that the pre-navigation salinity gradient is not sustainability in the long term in this sub basin. The strategy focuses on allowing the sub basin to transition to brackish/saline over time while managing the salinity gradient to the extent possible by utilizing the fresh water supply that is available from sources outside of the planning unit. The Sabine River and the Atchafalaya River are proposed as possible sources for increasing the fresh water supply to these sub basins. This strategy recognizes that new

management practices will not include newly proposed salinity control structures beyond those currently ready to accept construction funding.

Promoting the beneficial use of sediment and obtaining sediment from sources outside of this planning unit are important for preserving marsh. These measures are proposed even though the historical salinity gradient is not sustainable.

6.4 SUPPORTING DOCUMENTATION

Supporting documentation for PU 4 Alternative Plan formulation includes the following:

Figure 6.1	Boundary and Base Map
Figure 6.2	Concentrated and Distributed Assets Map
Table 6.1	Relative Damage from Storm Surge for Concentrated Assets
Table 6.2	Concentrated Assets Scoring
Table 6.3	Relative Damage from Storm Surge for Distributed Assets
Table 6.4	Distributed Assets Scoring
Table 6.5	Distributed Assets Identification
Table 6.6	Existing Conditions and Problem Identification Table
Table 6.7	Changes in Natural Resources, 1990-2050 Table
Figure 6.3	Ecosystem Units and Natural Resources Map
Table 6.8a	Objectives and Measures Table - Concentrated Assets
Table 6.8b	Objectives and Measures Table - Distributed Assets
Table 6.8c	Objectives and Measures Table – Ecosystem Units
Figure 6.4	Alternative One Map
Figure 6.5	Alternative Two Map

7 GLOSSARY

ACCEPTABILITY. Adequate to satisfy a need, requirement, or standard. One of the USACE requirements for a project.

ADAPTIVE MANAGEMENT. An interdisciplinary approach acknowledging our insufficient information base for decision-making; that uncertainty and change in managed resources are inevitable; and that new uncertainties will emerge. An iterative approach that includes monitoring and involves scientists, engineers and others who provide information and recommendations that are incorporated into management actions; results are then followed with further research, recommendations and management actions, and so on.

ALTERNATIVE PLAN. A single management measure or an assemblage of management measures that are developed and proposed in tandem to achieve objectives in a complete, effective, efficient, and acceptable manner. One or more management measures functioning together to address one or more objectives.

ANNUAL PLAN. The State coastal protection plan submitted annually to the Legislature as provided in this Part, including amendments to the plan. (Act 8)

AUTHORITY. Wetlands Conservation Coastal Protection and Restoration Authority. (Act 8)

BENEFICIAL USES OF DREDGED MATERIAL. Utilization of both dredging operations and dredged material placement for purposes of improving and restoring habitats, beaches, barrier islands and shorelines, institutional needs such as highway fill and dike/levee construction, recreational needs such as parks and marinas, navigational needs such as sediment and water management, industrial needs such as port operations, defense needs such as underwater storm surge protection (underwater berms) and off-shore breakwaters, and a myriad of other useful purposes.

BENEFITS. Valuation of positive performance measures.

BOTTOMLAND HARDWOOD FOREST. Low-lying forested wetlands found along streams and rivers.

BRACKISH MARSH. Intertidal plant community typically found in the area of the estuary where salinity ranges between 4-15 ppt.

CHENIER PLAIN. Western part of coastal Louisiana with little influence from Mississippi and Atchafalaya rivers.

CLEAN WATER ACT SECTION 404 (b) (1). There are several sections of this Act that pertain to regulating discharges into wetlands. The discharge of dredged or fill material into waters of the United States is subject to permitting specified under Title IV (Permits and

Licenses) of this Act and specifically under Section 404 (Discharges of Dredge or Fill Material) of the Act.

COASTAL AREA. The Louisiana Coastal Zone and contiguous areas subject to storm or tidal surge. (Act 8)

COASTAL PROTECTION. Plans, projects, policies, and programs intended to provide hurricane protection or coastal conservation or restoration. (Act 8)

COASTAL ZONE CONSISTENCY DETERMINATION. The U.S. Environmental Protection Agency reviews plans for activities in the coastal zone to ensure they are consistent with Federally-approved State Coastal Management Programs under Section 307(c)(3)(B) of the Coastal Zone Management Act.

COASTWIDE PLAN. Combination of alternative plans assembled to address an objective or set of objectives across the entire Louisiana Coast.

COMPLETENESS. The ability of a plan to address all of the objectives. One of the USACE four requirements for a project.

COMPREHENSIVE COASTAL PROTECTION. That level of protection that encompasses all problems and opportunities in Coastal Louisiana regarding hurricane and storm surge and winds, including both structural and environmental features. (Act 8)

COMPREHENSIVE MASTER PLAN. A document detailing long-term strategy for conservation, restoration, enhancement, management, and protection of the Coast of Louisiana, its citizens, its resources, its infrastructure, and its industries and economic interests. (Act 8)

CONCENTRATED ASSET. Those assets of community, industry, infrastructure, institutional and publicly-owned facilities, and strategic resources that occur in dense populations such as cities and towns, or clusters of industry, such as New Orleans Metro, Lake Charles Metro, and strategic industry of international, national, and regional importance.

CONSERVATION AND RESTORATION. The conservation, protection, enhancement, and restoration of coastal wetlands resources including but not limited to coastal wetlands and barrier shorelines and reef through the construction and management of coastal wetlands enhancement projects, including privately funded marsh management projects or plans, and those activities requiring a coastal use permit which significantly affect such projects or which significantly diminish the benefits of such projects or plans insofar as they are intended to conserve or enhance coastal wetlands consistent with the Legislative intent as expressed in R.S. 49:213.1. (Act 8)

CONTROL STRUCTURE. A gate, lock, or weir that controls the flow of water.

CPRA. Coastal Protection and Restoration Authority.

CREVASSE. A breach or gap in the levee or embankment of a river (natural or manmade), through which floodwaters flow.

CRITERIA. A standard, rule, or test on which a judgment or decision can be based. An acknowledged measure of comparison for quantitative or qualitative value. A degree or level of requirement, excellence, or attainment. Something set up or established as a rule for the measure of value or quality. A basis for comparison.

CUMULATIVE IMPACTS. The combined effect of all direct and indirect impacts to a resource over time.

CWPPRA. Coastal Wetlands Planning, Protection, and Restoration Act.

CWPPRA FUND. That fund of the CWPPRA law that is managed by the State, with projects being funded by the State under interagency coordination. (Act 8)

DEDICATED DREDGING. Dredging from a borrow source off-shore or elsewhere for use of material in a location that will lessen storm impacts from wind and wave conditions. This term can also apply to mitigation for dredging in a regulatory context.

DEGRADATION PHASE. The phase of the deltaic cycle when sediments are no longer delivered to a delta, and it experiences erosion, dieback, or breakup of marshes.

DELTAIC CYCLE. Capture of the Mississippi River by a distributary that offered a shorter route to the Gulf of Mexico. After abandonment of an older delta lobe, which would cut off the primary supply of fresh water and sediment, an area would undergo compaction, subsidence, and erosion. The old delta lobe would begin to retreat as the gulf advanced, forming lakes, bays, and sounds. Concurrently, a new delta lobe would begin its advance Gulfward.

DELTAIC DEPOSITS. Mud and sand deposited at the mouth of a river.

DELTAIC PLAIN. The land formed and reworked as the Mississippi River switched channels in the eastern part of the Louisiana coastal area.

DETACHED BREAKWATERS (NEAR-SHORE, STAGGERED, RIPRAP, OTHER). Structures constructed of stone, riprap, or other hard materials that are resistant to coastal erosion and wave energy. These structures are placed near the shoreline to provide a still-water zone behind them between a degrading shore and the structures, so that sediment can be trapped behind them. A modification of this is to also place sand material behind the structures, to hasten the process of shoreline restoration and stabilization.

DIRECT IMPACTS. Those effects that result from the initial construction of a measure (e.g., marsh destroyed during the dredging of a canal). Contrast with “Indirect Effects.”

DISTRIBUTED ASSETS. Those assets that are more widely spaced throughout the landscape, including small and rural communities, isolated small-scale business and light industry,

recreational areas, natural resource areas, and limited population areas, such as pipelines and electric distribution lines.

DIVERSION. A turning aside or alteration of the natural course or flow of water. In coastal restoration this usually consists of such actions as channeling water through a canal, pipe, or conduit to introduce water and water-borne resources into a receiving area.

DYNAMIC. Characterized by continuous change and activity.

ECOLOGICAL. Refers to the relationship between living things and their environment.

ECONOMIC. Of or relating to the production, development, and management of material wealth, as of a country, household, or business enterprise.

ECOSYSTEM. An organic community of plants and animals viewed within its physical environment (habitat); the ecosystem results from the interaction between soil, climate, vegetation and animal life.

ECOSYSTEM RESTORATION. Activities that seek to return a organic community of plants and animals and their habitat to a previously existing or improved natural condition or function.

EFFECTIVENESS. Having an intended or expected effect. One of the USACE four requirements for a project.

EFFICIENCY. The quality of exhibiting a high ratio of output to input. One of the USACE four requirements for a project.

ENDPOINTS. See Objectives.

ENHANCE OR ENHANCEMENT. To augment or increase/heighten the existing state of an area.

ENVIRONMENTAL IMPACT STATEMENT (EIS). A document that describes the positive and negative environmental effects of a proposed action and the possible alternatives to that action. The EIS is used by the federal government as a decision making tool and addresses human and natural environmental issues.

ESTUARY. A semi-enclosed body of water with freshwater input and a connection to the sea where fresh water and salt water mix.

ESTUARINE. Related to an estuary.

FEASIBILITY REPORT. A description of a proposed action, previously outlined in a general fashion in a Reconnaissance Report, that will satisfy the Federal interest and address the problems and needs identified for an area. It must include an assessment of impacts to the environment (either in an Environmental Assessment, or the more robust Environmental Impact

Statement), an analysis of alternative methods of completion, and the selection of a Recommended Plan through the use of a cost-effectiveness analysis.

FORMULATED RATIONALE. Reasons for combining management measures to form different alternative plans.

FRAMEWORK DEVELOPMENT TEAM (FDT). A group of professionals from various Federal and state agencies, academia and the public formed to provide a forum for individual members to discuss LCA Comprehensive Study activities and technical issues and to provide comments to the Senior Management Committee.

FRESH MARSH. Intertidal herbaceous plant community typically found in that area of the estuary with salinity ranging from 0-3 ppt.

FRESHWATER DIVERSIONS. Structural or non-structural changes or modifications in the banks of a river or stream that diverts water from them into another location where it is needed.

GRADIENT. A slope; a series of progressively increasing or decreasing differences in a system or organism.

HABITAT. The place where an organism lives; part of physical environment in which a plant or animal lives.

HABITAT LOSS. The disappearance of places where target groups of organisms live. In coastal restoration, usually refers to the conversion of marsh or swamp to open water.

HURRICANE PROTECTION. A system of barriers and associated elements to provide protection against tidal surges. (Act 8)

HYDRODYNAMIC. The continuous change or movement of water

HYDROGEOMORPHOLOGICAL (HGM). The scientific combination of hydrology and geomorphology for purposes of delineating and defining wetland boundaries and zones.

HYDROLOGY. The pattern of water movement on the earth's surface, in the soil and underlying rocks, and in the atmosphere.

INDIRECT IMPACTS. Those effects that are not as a direct result of project construction, but occur as secondary impacts due to changes in the environment brought about by the construction. Contrast with "Direct Impacts."

INFRASTRUCTURE. The basic facilities, services, and installations needed for the functioning of a community or society, such as transportation and communications systems, water and power lines, and public institutions including schools, post offices, and prisons.

INSTITUTIONAL AND PUBLICLY-OWNED ASSETS. Those assets such as military, police,

public courthouses and buildings, hospital, medical, fire, marine, and other similar properties that provide protection, transportation, evacuation, and other vital public services.

INTEGRATED PROTECTION AND RESTORATION. The combining of traditional protection features with flexible and innovating restoration features to provide optimum recovery and benefits both to human community and natural resource environment.

INTERMEDIATE MARSH (INM). Intertidal herbaceous plant community typically found in that area of the estuary with salinity ranging from 2-5 ppt.

INTERTIDAL. Alternately flooded and exposed by tides.

IPT. Integrated Planning Team.

ITT. Interdisciplinary Technical Team.

KEYSTONE STRATEGY. A strategy that other strategies rely upon for successful implementation.

LEVEES (FLOOD PROTECTION, WATER MANAGEMENT). Linear mounds of earth or stone built to prevent a river from overflowing; a long, broad, low ridge built by a stream on its flood plain along one or both banks of its channel in time of flood.

LEVEE BOARD. The board of directors of a levee district. The members of each board are specified in the creating legislation of each district. The members are appointed by the Governor, subject to the state laws governing Louisiana's boards and commissions.

LEVEE DISTRICT. A state taxing district whose boundaries are generally established to prevent flooding within specific watersheds, that has specified authorities, established by the state legislature, specifically created for flood protection, drainage, and/or hurricane protection purposes. Each individual levee district has specific authorizations which differ between the districts.

LOCALLY PREFERRED PLAN (LPP). Alternative plan preferred by local sponsor if other than the Recommended Plan.

LONG-TERM MANAGEMENT STRATEGY (LTMS). A purposeful development of a plan of action over a long time frame, generally not exceeding 100 years, that shows thought process, procedures, concepts, frameworks, and other criteria leading to the development of long-term management strategies for specifically identified areas. LTMS has been used by the USACE Districts throughout the United States for most of their major watersheds, estuaries, and river reaches, and set for 50- 100-yr time frames. Examples include Puget Sound, Columbia River, San Francisco Bay, the Great Lakes, the Upper Mississippi River, Galveston Bay, Mobile Bay, Savannah Harbor, Cape Fear River System, Norfolk Harbor, Chesapeake Bay, Hudson River, and others.

LOUISIANA ACT 8 OF 2005. A law passed under the First Extraordinary Session of 2005 of the Louisiana Legislature, that originated with House Bill No. 141 and Senate Bill No. 71, and detailing the long-term strategy for Coastal Louisiana protection and restoration. (Act 8)

LOUISIANA COASTAL AREA (LCA). The entire coastal area of the State of Louisiana as defined by the Coastal Zone Management Act.

MANAGED REALIGNMENT. The methodical and reasonable approach over time to withstanding erosion, subsidence, and other factors that alter the coastlines and shorelines of an area such as coastal Louisiana.

MANAGEMENT MEASURE. A discrete constructible or implementable action undertaken to achieve an objective. A feature or activity that can be implemented at a specific geographic site to address one or more planning objectives.

MASTER PLAN. The long-term comprehensive coastal protection plan combining hurricane protection and the protection, conservation, restoration, and enhancement of coastal wetlands and barrier shorelines or reefs, including amendments to the plan. It shall include but not be limited to State and political sub-division operations plans. (Act 8)

MEASURE. A programmatic restoration feature that can be assembled with other measures to produce alternative plans. See also “Project.”

METHODOLOGY. A set of practices, procedures, and rules.

MUDFLATS. Flat, non-vegetated wetlands subject to periodic flooding and minor wave action.

NATIONAL ECOSYSTEM RESTORATION. USACE standard for cost-effectiveness based on ecosystem, not economic, benefits.

NEAR-SHORE CURRENTS. Movement of water parallel to the shoreline. Usually generated by waves breaking on the shore at an angle other than perpendicular. Littoral drift pattern of a shoreline.

NATIONAL ENVIRONMENTAL POLICY ACT (NEPA). Ensures that Federal agencies consider the environmental impacts of their actions and decisions. NEPA requires all Federal agencies to consider the values of environmental preservation for all significant actions and prescribes procedural measures to ensure that those values are fully considered.

NET GAIN. The amount of cumulative land gain less land loss, when gain is greater than loss.

NET LOSS. The amount of cumulative land gain less land loss, when gain is less than loss.

NO ACTION ALTERNATIVE. The alternative in the LCA Plan which describes the ecosystem of the coastal area if no restoration efforts/projects were done.

OBJECTIVE. Something worked for or striven for. Something toward which an effort is directed. Statements that describe the results wanted by solving the problems and taking advantage of the opportunities.

PLAN FORMULATION PRINCIPLES. Rules or constraints that must be evaluated when developing plans.

PFT. Plan Framework Team.

PPT. Represents the parts per thousand of any chemicals or substances within a body of water, i.e., sea strength water is 35 ppt salt minerals.

PRIME FARMLAND. Land that has the best combination of physical and chemical characteristics for producing food, feed, fiber, forage, oilseed, and other agricultural crops with minimum inputs of fuel, fertilizer, pesticides, and labor, and without intolerable soil erosion. One of the categories of concern in the EIS.

PRINCIPLE. A basic truth or assumption. A fixed or predetermined policy or mode of action. A comprehensive and fundamental law, doctrine, or assumption. A basic generalization that is accepted as true and that can be used as a basis for reasoning and conduct. Framing statements that can be used to evaluate alternatives while considering issues that affect them. Used along with targets and assessments of ecosystem needs to provide guidance in formulation of alternative plans.

PRODUCTIVITY. Growth of plants and animals.

PROGRADATION. The phase during the deltaic cycle where land is being actively accreted through deposition of river sediments near the mouth.

PROGRAMMATIC ENVIRONMENTAL IMPACT STATEMENT (PEIS). An Environmental Impact Statement that supports a broad authorization for action, contingent on more specific detailing of impacts from specific measures.

PROGRAM. A management strategy with procedures, projects, schedules, operations, and related activities to achieve a stated goal or objective. (Act 8)

PROGRAM PRINCIPLES. Basic truths that cannot be violated during plan formulation.

PROJECT. A physical structure or structures designed and constructed according to the annual plan. (Act 8) A constructible increment of an alternative plan.

PROJECT IMPLEMENTATION REPORT (PIR). A project-specific follow-up report that expands on the information contained in a Programmatic Feasibility Report to ensure NEPA compliance, such as conducting public meetings, preparing the appropriate environmental documentation, and preparing the engineering designs as specifications necessary to build the project.

PROVINCE. A major division of the coastal zone of Louisiana. (e.g., Deltaic Plain and Chenier Plain).

PURPOSE. A statement of intent regarding intended use of something.

REBUILD. To some extent build back a structure/landform that had once existed.

REDUCE. To diminish the rate or speed of a process.

REHABILITATE. To focus on historical or pre-existing ecosystems as models or references while emphasizing the reparation of ecosystem processes, productivity and service.

RELATIVE SEA LEVEL RISE. The sum of the sinking of the land (subsidence) and eustatic sea level change; the change in average water level with respect to the surface.

RESTORE. Return a wetland to a close approximation of its condition or function prior to disturbance by modifying conditions responsible for the loss or change; re-establish the function and structure of that ecosystem.

SALT MARSH. Intertidal herbaceous plant community typically found in that area of the estuary with salinity ranging from 12-32 ppt.

SALINITY. The concentration of dissolved salts in a body of water, commonly expressed as parts per thousand. See PPT.

SCOPING. Soliciting and receiving public input to determine issues, resources, impacts, and alternatives to be addressed in the draft EIS.

SDT. Strategic Design Team.

SEA LEVEL. Long-term average position of the sea surface.

SEDIMENT PLUME. Caused by sediment rich rainwater runoff entering the ocean. The runoff creates a visible pattern of brown water that is rich in nutrients and suspended sediments that forms a kind of cloud in the water spreading out from the coastline. Commonly forms at river and stream mouths, near sloughs, and along coasts where a large amount of rain runoff flows directly into the ocean.

SEDIMENT TRAPS. Deliberate dredging of a deep water area so that it can re-fill with riverine or littoral drift sediments to provide material to be used elsewhere in the coastal zone.

SHEET FLOW. Flow of water, sediment, and nutrients across a flooded wetland surface, as opposed to through channels.

SHOALING. The shallowing of an open-water area through deposition of sediments.

SIPHON. The deliberate pulling via vacuum of water and sediment from within the water column of the Mississippi River and letting it flow across the berms or levee into an area that is in need of fresh water and sediment.

SOCIOECONOMIC. Involving both social and economic factors.

SPOIL BANKS. Dredged material removed from canals and piled in a linear mound along the edge of canals.

STABILIZE. To fix the level or fluctuation of; to make stable.

STORM OVERWASH. The process by which sand is transposed landward over the dunes during a storm event by waves.

STORM SURGE. That wind driven water surge accompanying strong storms and hurricanes. (Act 8)

STRATEGIC ASSET. Those physical assets such as oil and gas refineries and other facilities, ports, transportation corridors, chemical plants, and similar industrial and economic assets of international, national, regional, and state significance.

STRATEGIC RETREAT. The deliberate management of people, resources, natural habitats, and other coastal features to allow for a slow retreat or realignment from areas that cannot be defended, either for physical or for economic reasons, or both.

STRATEGY. Ecosystem restoration concept from the Coast 2050 Plan.

SUB-PROVINCE. The divisions of the two Provinces (see “Province”) into smaller groupings: 1) east of the Mississippi River; 2) west of the Mississippi River to Bayou Lafourche; 3) Bayou Lafourche to Freshwater Bayou; 4) Freshwater Bayou to Sabine River.

SUBSIDENCE. The gradual downward settling or sinking of the Earth’s surface with little or no horizontal motion.

SUSTAIN. To support and provide with nourishment to keep in existence; maintain.

TURBIDITY. The level of suspended sediments in water; opposite of clarity or clearness.

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Appendix A. Pontchartrain Basin.

Appendix B. Breton Sound Basin.

Appendix C. Mississippi River Delta Basin.

Appendix D. Barataria Basin. .

Appendix E. Terrebonne Basin. .

Appendix F. Atchafalaya Basin.

Appendix G. Teche/Vermilion Basin.

Appendix H. Mermentau Basin.

Appendix I. Calcasieu/Sabine Basin.

Appendix J. Public Views and Responses.

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Appendix A. Federal/State/Local Partnership and Public Involvement.

- Appendix B. Technical Methods.
- Appendix C. Region 1 Supplemental Information.
- Appendix D. Region 2 Supplemental Information.
- Appendix E. Region 3 Supplemental Information.
- Appendix F. Region 4 Supplemental Information.

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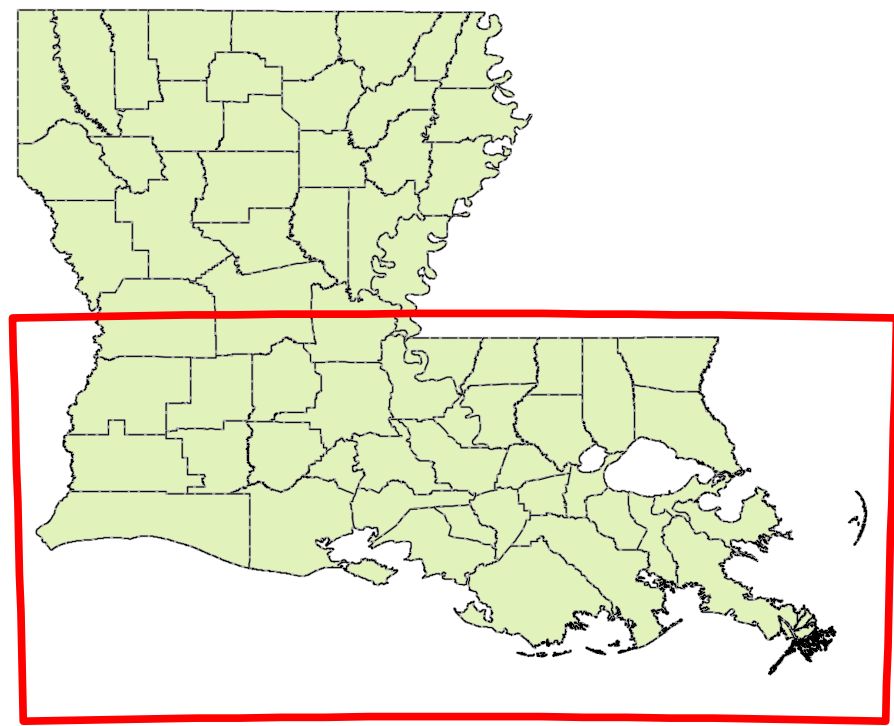
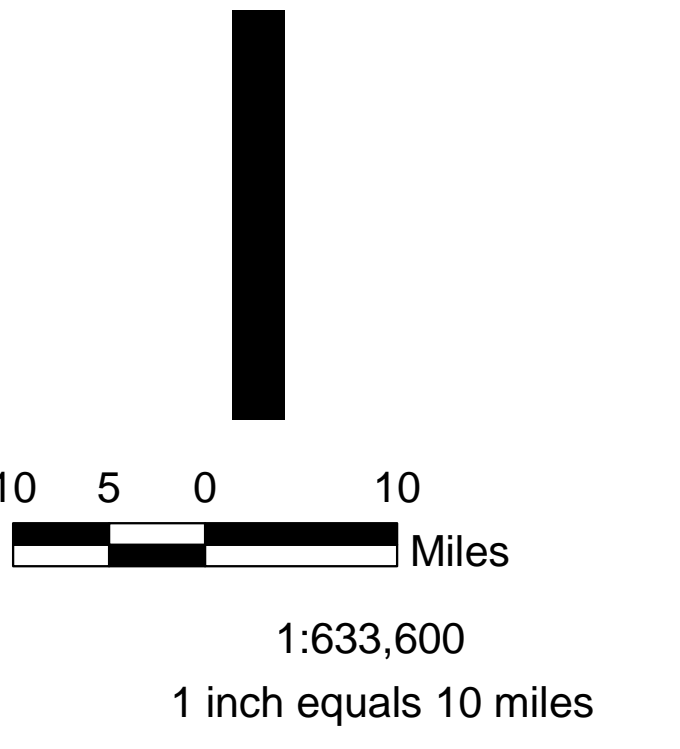
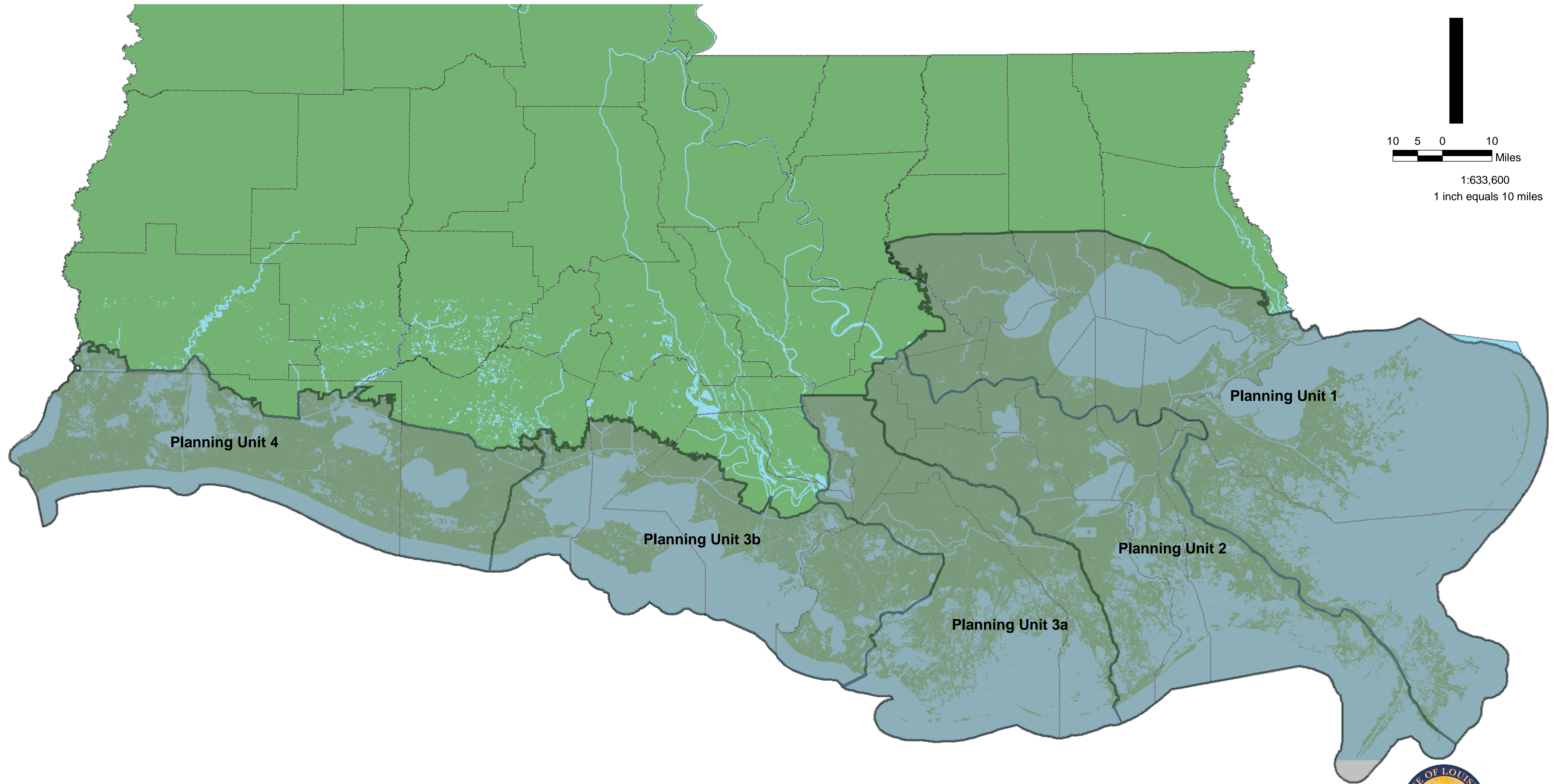
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Appendix A. USFWS Fish and Wildlife Benefits Evaluation.
Appendix B. Programmatic Environmental Impact Statement.
Appendix C. Engineering Investigations.
Appendix D. Hydrodynamic and Ecological Modeling.
Appendix E. Economics.
Appendix F. Real Estate.
Appendix G. U. S. Geological Survey Landloss Modeling.
Appendix H. Cultural Resources.
Appendix I. Value Engineering and ITR Report.
Appendix J. Public Involvement.
Appendix K. National Technical Review Committee Report.
Appendix L. Comments and Responses.



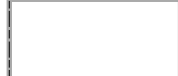

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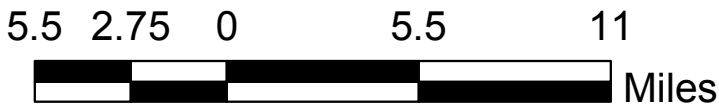
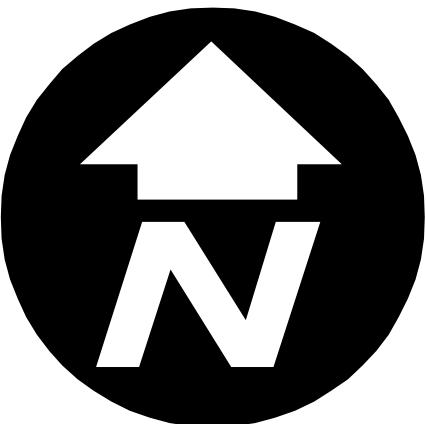
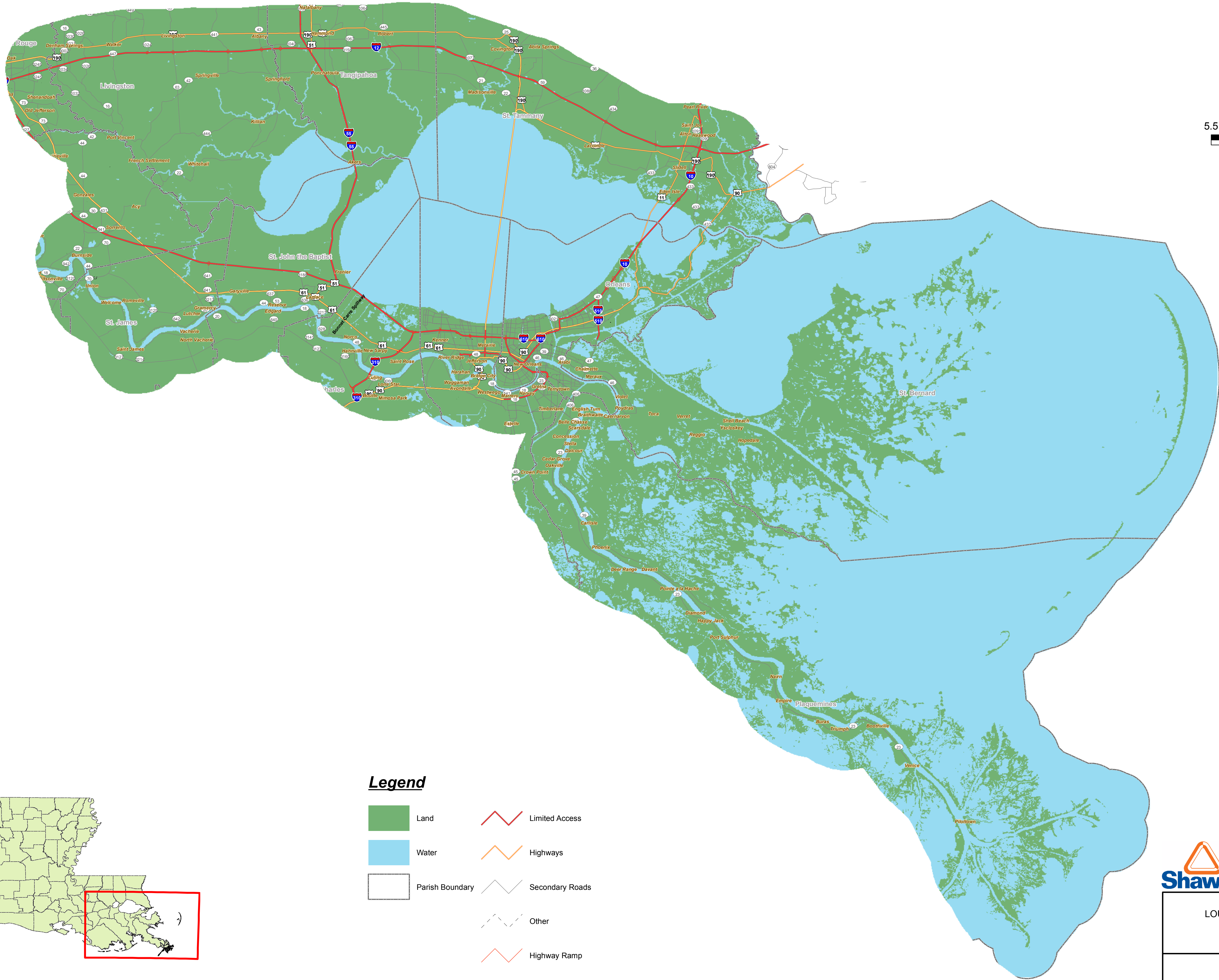
-  Land
-  Water
-  Parish Boundary
-  Planning Unit Boundary



LOUISIANA COMPREHENSIVE COASTAL
PROTECTION MASTER PLAN

FIGURE 1.2

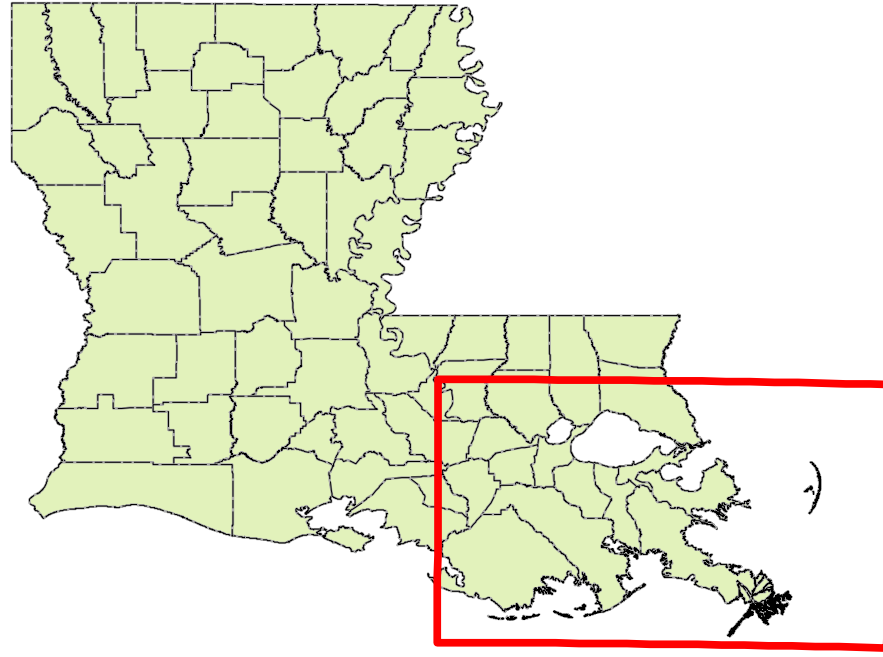
PLANNING UNITS



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1 inch equals 5.5 miles

Legend

- | | | | |
|--|-----------------|--|-----------------|
| | Land | | Limited Access |
| | Water | | Highways |
| | Parish Boundary | | Secondary Roads |
| | | | Other |
| | | | Highway Ramp |



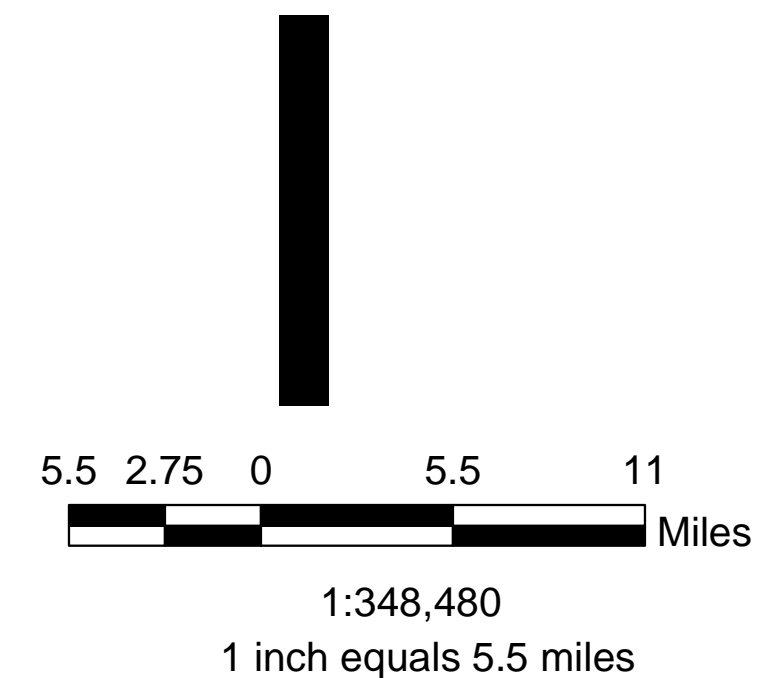
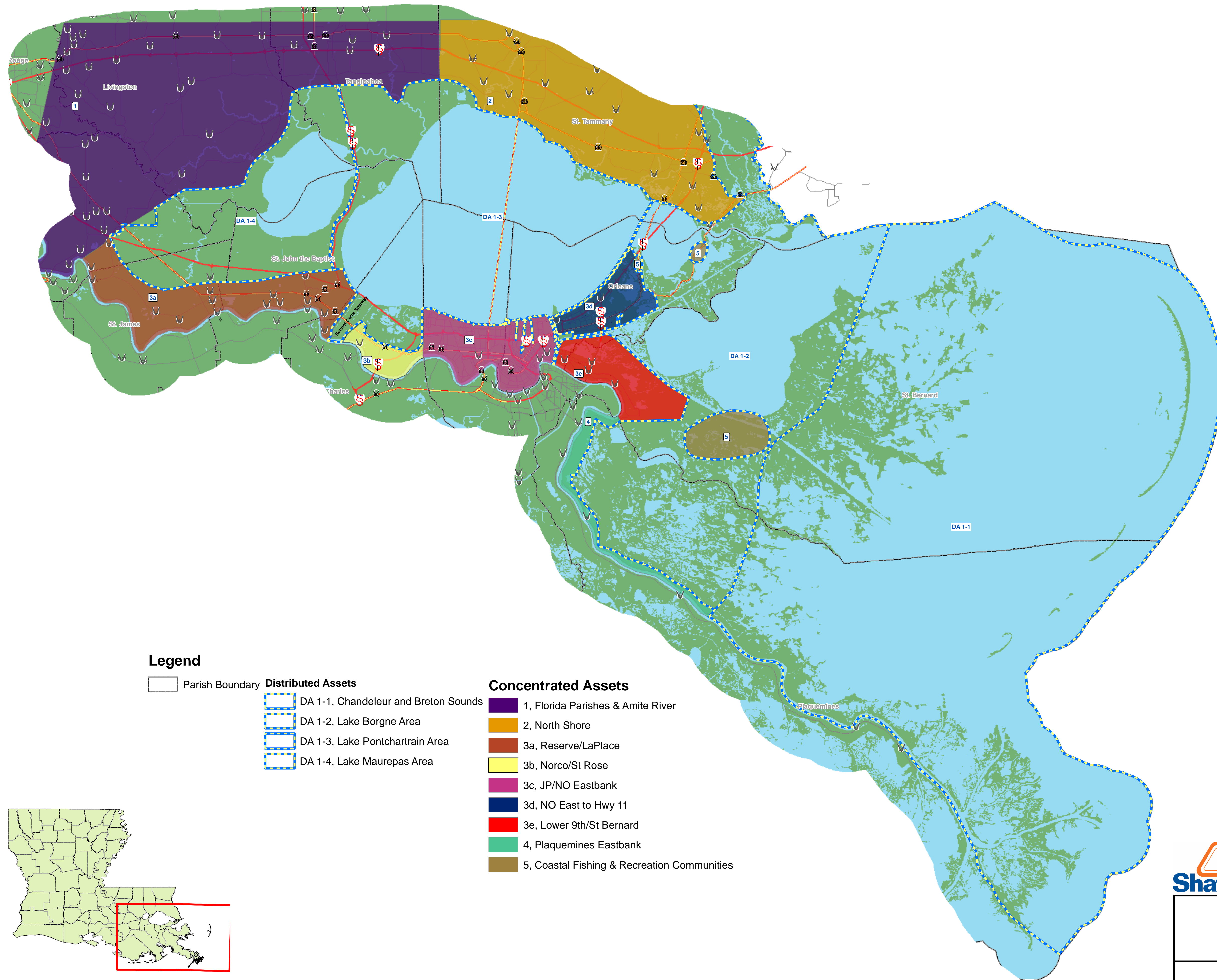
LOUISIANA COMPREHENSIVE COASTAL
PROTECTION MASTER PLAN

FIGURE 2.1

**PLANNING UNIT 1
BOUNDARY AND BASE MAP**

Coordinate system: Louisiana South State Plane feet, NAD83, FIPS Zone 1702

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LOUISIANA COMPREHENSIVE COASTAL
PROTECTION MASTER PLAN

FIGURE 2.2

PLANNING UNIT 1
CONCENTRATED ASSETS AND
DISTRIBUTED ASSETS

Coordinate system: Louisiana South State Plane feet, NAD83, FIPS Zone 1702

PLANNING UNIT 1 - East of the Mississippi River

Table 2.1 Relative Damages from Storm Surge to Concentrated Assets

Proportion of assets damaged or destroyed due to storm surge: EL = Extremely Low (0-5%) L = Low (5 - 15%) M = Medium (15 - 25%) H = High (25 - 50%) EH = Extremely High (>50%)	Storm Surge at Coastline (Feet)	Florida Parishes & Amite River	North Shore	New Orleans Metro Area					Plaquemines Eastbank	Coastal Fishing & Recreation Communities (Outside Levees)
				3a Reserve/ Laplace	3b Norco/ St. Rose	3c JP / NO Eastbank	3d NO East to Hwy 11	3e Lower 9th/ St. Bernard		
	5	EL	L	EL	EL	EL	EL	EL	L	L
	10	L	M	EL	EL	EL	EL	EL	M	L
	15	L	H	EL	EL	EL	EL	EL	H	EH
	20	M	EH	EH	EH	EH	EH	EH	EH	EH
	25	H	EH	EH	EH	EH	EH	EH	EH	EH
	30	EH	EH	EH	EH	EH	EH	EH	EH	EH

Table 2.2 Concentrated Assets Scoring

Scoring Criteria	Maximum Score for Resource	Florida Parishes & Amite River	North Shore	New Orleans Metro Area					Plaquemines Eastbank	Coastal Fishing & Recreation Communities (Outside Levees)
				3a Reserve/ Laplace	3b Norco/ St. Rose	3c JP/NO Eastbank	3d NO East to Hwy 11	3e Lower 9th/ St. Bernard		
1. Residences	25	10	20	15	20	25	25	25	10	5
2. Industry	20	15	15	20	20	20	20	15	5	5
3. Infrastructure	15	15	15	15	15	15	15	15	8	10
4. Institutional & Publicly Owned Facilities	15	15	15	15	15	15	15	15	10	2
5. Strategic Resources	25	15	25	25	25	25	25	25	5	2
Total Score	100	70	90	90	95	100	100	95	38	24

Table 2.3 Relative Damages from Storm Surge to Distributed Assets¹

Proportion of assets damaged or destroyed due to storm surge: EL = Extremely Low (0-5%) L = Low (5 - 15%) M = Medium (15 - 25%) H = High (25 - 50%) EH = Extremely High (>50%)	Storm Surge at Coastline (Feet)	DA1-1 Chandeleur and Brenton Sounds	DA1-2 Lake Borgne Area	DA1-3 Lake Pontchartrain Area	DA1-4 Lake Maurepas Area
	5	L	EL	EL	EL
	10	M	L	EL	EL
	15	H	H	L	L
	20	EH	EH	M	M
	25	EH	EH	H	H
	30	EH	EH	EH	EH

¹ Assets outside of the defined concentrated areas (see Concentrated and Distributed Assets Map)

Table 2.4 Scoring of Distributed Assets

Scoring Criteria	Maximum Score for Resources	DA1-1 Chandeleur and Brenton Sounds	DA1-2 Lake Borgne Area	DA1-3 Lake Pontchartrain Area	DA1-4 Lake Maurepas Area
National Significance	25	5	25	25	5
State Significance	25	5	20	15	15
Local Significance	25	15	20	20	10
Critical to Recovery	25	25	25	25	25
Total Score	100	50	90	85	55

TABLE 2.5. DISTRIBUTED ASSETS FOR PLANNING UNIT 1

The land outside the defined communities was divided into areas of surge impact commonality. For Planning Unit 1 these are defined by the significant water bodies that impact these areas:

Chandeleur and Breton Sounds = DA 1-1
 Lake Borgne = DA 1-2
 Lake Pontchartrain = DA 1-3
 Lake Maurepas = DA 1-4

Within these areas following assets are comprised:

	Assets	Oil & Gas	Pipelines	Highway, Bridges & Transportation	Evacuation Routes	Ports, Waterway & Infrastructure	Other Strategic Assets
DA 1-1	Oil & Gas Fields and Pipelines	X	X				
	MRGO					X	
	US Coast Guard Tower						X
DA 1-2	Oil & Gas Fields and Pipelines	X	X				
	Hwy 11			X	X		
	I-10			X	X		
	Hwy 190			X	X		
	Twin Span			X	X		
	Hwy 11 Bridge			X	X		
	Rigolet Bridge			X	X		
	Jeff Pass Bridge			X	X		
	GIWW					X	
	MRGO					X	
DA 1-3	I-55			X	X		
	I-10			X	X		
	I-310			X	X		
	Causeway Bridge			X	X		
DA 1-4	I-10			X	X		
	Hwy 61 (Airline Hwy)			X	X		

Table 2.6. Planning Unit 1 Existing Conditions/ Problem Identification

NOTE: Rankings are only relatable within an ecosystem unit; the purpose is not to prioritize between units, but rather to prioritize function disruptions within ecosystem units

Function Disruption (System Threat)	Ecosystem Unit									
	EU 1-1	EU 1-2	EU 1-3	EU 1 -4	EU 1-5	EU 1-6	EU 1-7	EU 1-8	EU 1-9	EU 1-10
	Upper Basin Swamps	North and South Shore of Lake Pontchartrain	Orleans Land Bridge	Southern Lk Borgne Rim - Includes MRGO	Central Wetlands - Includes MRGO disposal area	Upper Breton Marshes	Fringing Marshes	Biloxi Marshes	Barrier Chain & Sound	Delta
Subsidence	M	L	L	M	M	H	H	L	M	VH
Tidal Exchange	NI	M	L	M	NI	L	M	L	NI	H
Sediment Disruptions	H	L	L	H	H	M	H	M	NI	VH
Salt Water Intrusion	L	M	L	H	L	L	M	L	NI	VH
Altered Inundation	VH	L	M	M	H	L	L	M	NI	NI
Wave/Wake Energy	L	H	H	VH	NI	VH	H	M	H	H
Direct Removal	L	L	L	H	M	M	M	M	L	L

No Impact	NI
Low	L
Moderate	M
High	H
Very High	VH

Subsidence = true subsidence; benchmark elevations not referenced to tide gauges

Tidal Exchange = Damage caused by daily tide energy; assumed to be more destructive to historically fresh/intermediate wetlands, more beneficial to brackish/saline wetlands

Sediment Disruptions = disconnection from riverine sources

Saltwater Intrusion = due to encroachment of Gulf on landscape edge or movement up canals & channels

Altered Inundation = altered frequency or duration of inundation, not related to RSLR; e.g., impoundments

Wave/Wake Energy = includes storm energy

Direct Removal = dredging sediments or covering by spoil banks & levees.

Table 2.7. Planning Unit 1 Changes in Natural Resources, 1990 - 2050 (From Coast 2050 Report; LCA Land Change Map)

Resource	Ecosystem Unit									
	EU 1-1 Upper Basin Swamps	EU 1-2 North and South Shore of Lake Pontchartrain	EU 1-3 Orleans Land Bridge	EU 1-4 Southern Lk Borgne Rim	EU 1-5 Central Wetlands	EU 1-6 Upper Breton Marshes	EU 1-7 Fringing Marshes	EU 1-8 Biloxi Marshes	EU 1-9 Barrier Chain & Sound**	EU 1-10 Delta
Swamp	H	H	NA*	NA	NA*	NA	NA	NA	NA	NA
Fresh/Intermediate Marsh	I	H	L	NA	NA	L	NA	NA	NA	M
Brackish/Saline Marsh	NA	L	L	M	L	NA*	M	M	NA	NA
Beach/Dune/Back Barrier Marsh	NA	NA	NA	NA	NA	NA	NA	NA	H	NA
Sessile Estuarine (Oysters)	NI	NI	S	D	D	I	S	S	U	S
Saltwater (Red Drum)	NI	D	D	D	S	I	S	D	U	D
Freshwater (Largemouth Bass)	S	S	D	NI	NI	I	NI	NI	U	S
Estuarine (Spotted Seatrout)	NI	D	D	D	S	S	S	D	U	D
Estuarine (Shrimp)	S	D	D	D	S	I	S	D	U	D
Woodland Edge (Deer)	D	S	S	D	D	S	NI	NI	U	S
Woodland Avifauna	D	D	NI	U	S	NI	NI	NI	U	U
Fresh Wetlands (Alligator)	I	S	I	D	D	S	S	D	NI	S
Muskrat	S	S	S	D	D	S	S	D	NI	S
Shore Birds	D	S	D	D	S	S	D	D	U	D
Loss of Storm Attenuation***	M	H	L	M	L	L	M	M	M	M

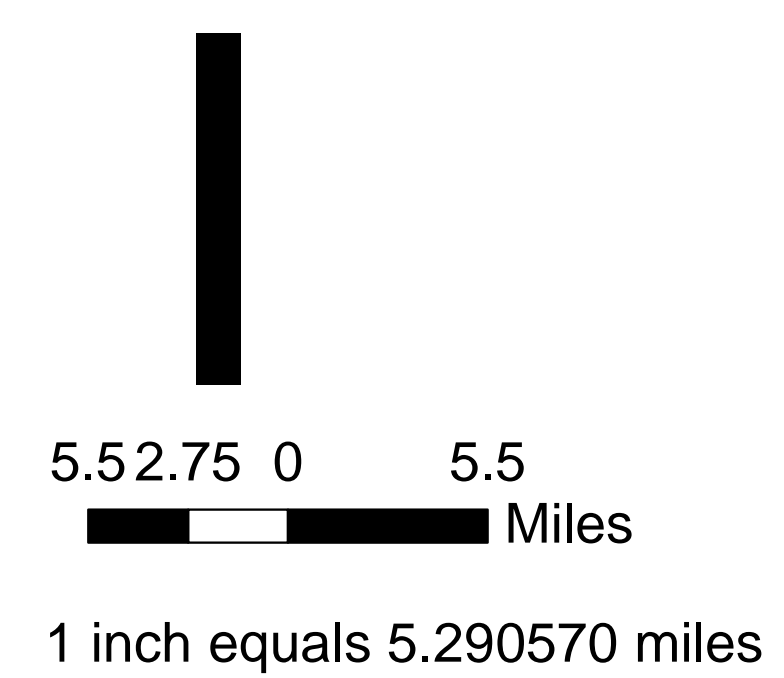
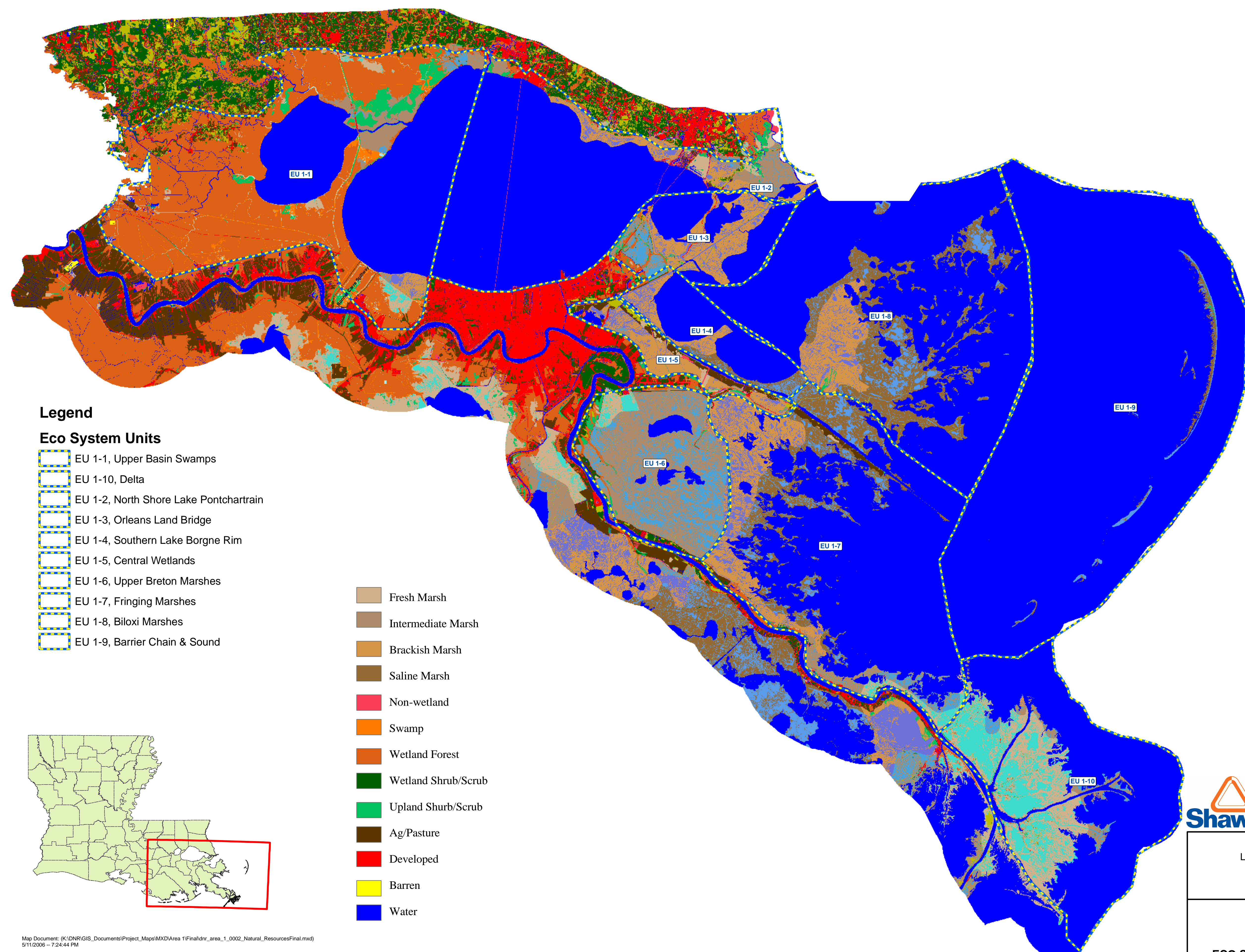
Wetland Key		% Change	Fish & Wildlife Key	
No Impact	NI	0	No Impact/Not historically present	NI
Low Loss	L	1-15	Steady	S
Moderate Loss	M	16-49	Decrease	D
High Loss	H	>50	Increase	I
Increase	I		Unknown (No information)	U
Not Applicable	NA			

NOTES:

* = Small acreage by percentage w/in ecosystem unit

** = Lake Pontchartrain Atlas

*** = Using land change as the surrogate for changes in storm attenuation capacity

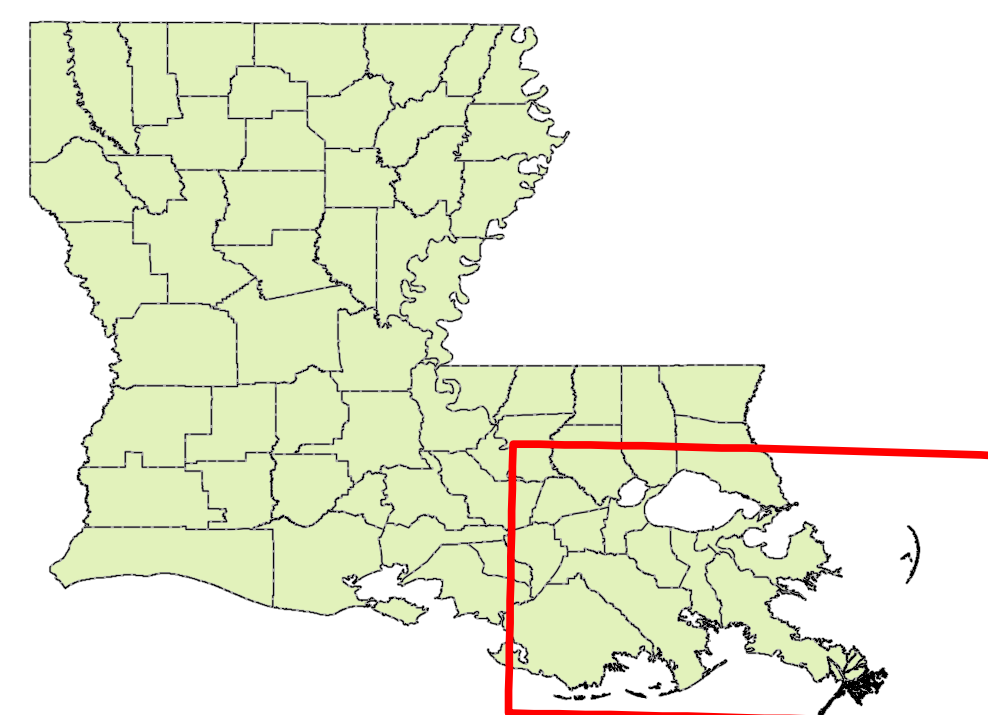


Legend

Eco System Units

- EU 1-1, Upper Basin Swamps
- EU 1-10, Delta
- EU 1-2, North Shore Lake Pontchartrain
- EU 1-3, Orleans Land Bridge
- EU 1-4, Southern Lake Borgne Rim
- EU 1-5, Central Wetlands
- EU 1-6, Upper Breton Marshes
- EU 1-7, Fringing Marshes
- EU 1-8, Biloxi Marshes
- EU 1-9, Barrier Chain & Sound

- Fresh Marsh
- Intermediate Marsh
- Brackish Marsh
- Saline Marsh
- Non-wetland
- Swamp
- Wetland Forest
- Wetland Shrub/Scrub
- Upland Shrub/Scrub
- Ag/Pasture
- Developed
- Barren
- Water



LOUISIANA COMPREHENSIVE COASTAL
PROTECTION MASTER PLAN

FIGURE 2.3

**PLANNING UNIT 1
ECO SYSTEM UNITS/NATURAL RESOURCES**

Table 2.8a Planning Unit 1: Objectives and Measures Table - Concentrated Assets

	Geographic Location		Current Issues*	Future Risk/Impact	Planning Unit Objective	Coastal Objectives	Measures																													
							1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
							Levee Alignment No. 1 (Alternate East Levee Alignment)	Re-evaluation of south shore of Lake Pontchartrain Levee Alignment and connection to Levee Alignment 1	Open-System Pontchartrain Basin Hurricane Protection Levee Alignment Alternative incl.	Suggested Modification of Lake Pontchartrain Basin Ba	Construct New Floodgate at Bohemia (Mississippi River)	Raise Both Sides of Levee on Mississippi R. (Bohemia to just north of Caernarvon)	Raise 40 Arpent Levee to 17.5' (from Industrial Canal to Verret with tie-in at Verret)	Construct New MRGO Lock and Extend MRGO Eastbank Levee	Enhance Levees along the Intracoastal (north towards Lake Pontchartrain), the GIWW, the Industrial Canal, and the MRGO	Construct a Sill at Seabrook (Industrial Canal at Lake Pontchartrain)	Maintain the MRGO - Lake Borgne Landbridge Including Shoreline Protection/Restoration Features	Restore the Bayou LaLoutre Ridge (Includes Constriction of MRGO to GIWW Dimensions)	Restore the Chandeleur Barrier Islands	Construct the Jefferson Parish Fringe Marsh Buffer	Construct the Violet Reintroduction to Maintain Target Salinity in Louisiana and Mississippi	Maintain and Restore Biloxi Marsh Landbridge and Barrier Reefs - South	Maintain and Restore Biloxi Marsh Landbridge and Barrier Reefs - North	Maintain Critical Marsh Shorelines and Ridges of the East Orleans Landbridge	Modification of Caernarvon Diversion (Maintain Breton Landbridge)	Maintain and Enhance the Maurepas Landbridge with Maurepas Reintroduction	1,000 cfs Diversion at Convent/Blind River	5,000 cfs Diversion at Convent/Blind River	10,000 cfs Diversion at Convent/Blind River	1,000 cfs Diversion at Hope Canal	1,000 cfs Diversion at Reserve Relief Canal	5,000 cfs Diversion at Bonnet Carre Spillway (incl. Diversion into LaBranche Wetlands)	10,000 cfs Diversion at Bonnet Carre Spillway (incl. Diversion into LaBranche Wetlands)	6,000 cfs Diversion at White's Ditch	10,000 cfs Diversion at White's Ditch	15,000 cfs Diversion at American/California Bay
							Alt 1** Alt 2**	Alt 1, Alt 2									Alt 1, Alt 2	Alt 1, Alt 2	Alt 1, Alt 2	Alt 1, Alt 2	Alt 2	Alt 1, Alt 2	Alt 2	Alt 2	Alt 1, Alt 2		Alt 1, Alt 2			Alt 1, Alt 2					Alt 1, Alt 2	
Concentrated Assets	Florida Parishes and Amite River		High flood risk to Concentrated Assets with storm surges over 25 ft.	Increased flood risk to assets due to sea level rise, subsidence, and wetland loss.	Provide coastal protection to Florida Parishes and Amite River Concentrated Assets.	A	+			+										+		+														
	North Shore		High level of flood risk to Concentrated Assets with storm surges over 15 ft.	Increased flood risk to assets due to sea level rise, subsidence, and wetland loss.	Provide coastal protection to North Shore Concentrated Assets.	A	+			+											+															
	New Orleans Metro Area	Reserve/LaPlace	Extremely high flood risk to Concentrated Assets with storm surges over 20 ft.	Increased flood risk to assets due to sea level rise, subsidence, and wetland loss.	Provide coastal protection to Reserve/LaPlace Concentrated assets.	A	+				+											+	+	+												
		Norco/St. Rose	Extremely high level of flood risk to Concentrated Assets with storm surges over 20 ft.	Increased flood risk to assets due to sea level rise, subsidence, and wetland loss.	Provide coastal protection to Reserve/LaPlace Concentrated assets.	A	+					+											+	+	+											
		JP/NO Eastbank	Extremely high level of flood risk to Concentrated Assets with storm surges over 20 ft.	Increased flood risk to assets due to sea level rise, subsidence, and wetland loss.	Provide coastal protection to JP/NO Eastbank Concentrated Assets.	A	+	+	+	+	+				+	+							+	+	+											
		NO East to Hwy 11	Extremely high flood risk to Concentrated Assets with storm surges over 20 ft.	Increased flood risk due to assets due to sea level rise, subsidence, and wetland loss.	Provide coastal protection to NO East to Hwy 11 Concentrated Assets.	A	+	+	+	+	+				+	+	+	+					+	+	+											
		Lower 9th/St. Bernard	Extremely high flood risk to Concentrated Assets with storm surges over 20 ft.	Increased flood risk to assets due to sea level rise, subsidence, and wetland loss.	Provide coastal protection to Lower 9th/St. Bernard Concentrated Assets.	A	+		+	+	+	+			+	+	+	+					+	+		+										
	Plaquemines Eastbank		High flood risk to Concentrated Assets with storm surges over 15 ft.	Increased flood risk to assets due to sea level rise, subsidence, and wetland loss.	Provide coastal protection to Plaquemines Eastbank Concentrated Assets.	A	+			+	+										+	+		+												
	Coastal Fishing and Recreation (Outside Levees)		Extremely high flood risk to Concentrated Assets with storm surges over 15 ft.	Increased flood risk to assets due to sea level rise, subsidence, and wetland loss.	Provide coastal protection to Coastal Fishing and Recreation Areas outside levees.	A	+		-	+											+	+	+	+												

* Current issues, percent flooded: H = High (25-50%); EH= Extremely High (> 50%)

** Alternative Plan (Measure used in Alternative Plans)

- Coastwide Objectives:
- A - Reduce storm damage vulnerability of coastal communities, resources, and infrastructure.
 - B - Minimize exposure of traditional flood protection measures to open Gulf conditions.
 - C - Increase sediment input from sources outside estuarine basins, and manage existing sediment resources within estuarine basines, to sustain and rejuvenate existing wetlands, rebuild marsh substrate and construct flood protections projects.
 - D - Maintain or establish natural landscape features and hydrologic processes that are critical to sustainable ecosystems structure and function, including dissipation of storm energy.
 - E - Establish or maintain dynamic salinity gradients that reflect natural cycles of freshwater availability and marine forcing (fluctuation related to normal daily and seasonal tide action or exchange).
 - F - Sustain productive and diverse wildlife habitats.
 - G - Maximize retention of river-borne sediments and nutrients within coastal wetlands.

Concentrated Assets Table Legend		
Page 1	Page 2	Page 3

(Continued on Page 2)

Table 2.8a Planning Unit 1: Objectives and Measures Table - Concentrated Assets

	Geographic Location		Current Issues*	Future Risk/Impact	Planning Unit Objective	Coastal Objectives	Measures																													
							31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
							110,000 cfs Diversion at American/California Bay with \$	250,000 cfs Diversion at American/California Bay with Sediment Enrichment	12,000 cfs Diversion at Bayou Lamoque	15,000 cfs Diversion at Fort St. Phillip	26,000 cfs Diversion at Fort St. Phillip with Sediment En	52,000 cfs Diversion at Fort St. Phillip with Sediment Enrichment	Sediment Delivery by Pipeline at American/California Bay	Sediment Delivery by Pipeline at Central Wetlands	Sediment Delivery by Pipeline at Fort St. Phillips	Sediment Delivery by Pipeline at Golden Triangle	Sediment Delivery by Pipeline at LaBranche	Sediment Delivery by Pipeline at Quarantine Bay	Increase Amite River Influence by Gapping Dredged Material Banks on Diversion Canals	Renovate water appropriation infrastructure - Change for the Diversion of Water through Inner Harbor Navigation Canal for Enhanced Influence to the Central Wetlands	Opportunistic Use of the Bonnet Carré Spillway	Restore Main Pass Ridge with Dredge Material	Remove Old Grand Prairie Levee	Add New Bank Line Stabilization (Lake Borgne Corner at GIMW to Verret)	Add Breakwater (in Lake Borgne from Southwest Corner to Bloxi Wildlife Management Area)	Resolve/Close the MRGO to Deep Draft Navigation	Create Marsh in Interior Open Water Areas and Install Shore Protection Features on the North Shore of Lake Pontchartrain.	Construct 3 or 4 Small Mississippi River Spillways through the Protected Corridor between Carlisle and Bohemia.	Remove the Gates from the Existing Bayou Lamoque Diversion Structure.	Construct two 5,000 cfs Diversions into the Maurepas Swamps	Construct a Band of Marsh Across the Basin from Point a-la-Hache Northeastward to MRGO Spillbank at the Heads of the Major Bays and Lakes.	Goose Point / Point Platte Marsh Creation	LaBranche Wetlands Terracing, Planting, Shoreline Protection	Pass-a-Louise Crevasse (Deauthorized)	Periodic Introduction of Sediment and Nutrients at Selected Diversion Sites Demonstration (half in PU-1)	Mississippi River Sediment Trap (half in PU-1)
Concentrated Assets	Florida Parishes and Amite River		High flood risk to Concentrated Assets with storm surges over 25 ft.	Increased flood risk to assets due to sea level rise, subsidence, and wetland loss.	Provide coastal protection to Florida Parishes and Amite River Concentrated Assets.	Alt 2**																														
	North Shore		High level of flood risk to Concentrated Assets with storm surges over 15 ft.	Increased flood risk to assets due to sea level rise, subsidence, and wetland loss.	Provide coastal protection to North Shore Concentrated Assets.																		+													
	New Orleans Metro Area	Reserve/LaPlace	Extremely high flood risk to Concentrated Assets with storm surges over 20 ft.	Increased flood risk to assets due to sea level rise, subsidence, and wetland loss.	Provide coastal protection to Reserve/LaPlace Concentrated assets.																															
		Norco/St. Rose	Extremely high level of flood risk to Concentrated Assets with storm surges over 20 ft.	Increased flood risk to assets due to sea level rise, subsidence, and wetland loss.	Provide coastal protection to Reserve/LaPlace Concentrated assets.																															
		JP/NO Eastbank	Extremely high level of flood risk to Concentrated Assets with storm surges over 20 ft.	Increased flood risk to assets due to sea level rise, subsidence, and wetland loss.	Provide coastal protection to JP/NO Eastbank Concentrated Assets.																															
		NO East to Hwy 11	Extremely high flood risk to Concentrated Assets with storm surges over 20 ft.	Increased flood risk due to assets due to sea level rise, subsidence, and wetland loss.	Provide coastal protection to NO East to Hwy 11 Concentrated Assets.																															
		Lower 9th/St. Bernard	Extremely high flood risk to Concentrated Assets with storm surges over 20 ft.	Increased flood risk to assets due to sea level rise, subsidence, and wetland loss.	Provide coastal protection to Lower 9th/St. Bernard Concentrated Assets.																															
	Plaquemines Eastbank		High flood risk to Concentrated Assets with storm surges over 15 ft.	Increased flood risk to assets due to sea level rise, subsidence, and wetland loss.	Provide coastal protection to Plaquemines Eastbank Concentrated Assets.																															
	Coastal Fishing and Recreation (Outside Levees)		Extremely high flood risk to Concentrated Assets with storm surges over 15 ft.	Increased flood risk to assets due to sea level rise, subsidence, and wetland loss.	Provide coastal protection to Coastal Fishing and Recreation Areas outside levees.																															

* Current issues, percent flooded: H = High (25-50%); EH= Extremely High (> 50%)
** Alternative Plan (Measure used in Alternative Plans)

Coastwide Objectives:
A - Reduce storm damage vulnerability of coastal communities, resources, and infrastructure.
B - Minimize exposure of traditional flood protection measures to open Gulf conditions.
C - Increase sediment input from sources outside estuarine basins, and manage existing sediment resources within estuarine basines, to sustain and rejuvenate existing wetlands, rebuild marsh substrate and construct flood protections projects.
D - Maintain or establish natural landscape features and hydrologic processes that are critical to sustainable ecosystems structure and function, including dissipation of storm energy.
E - Establish or maintain dynamic salinity gradients that reflect natural cycles of freshwater availability and marine forcing (fluctuation related to normal daily and seasonal tide action or exchange).
F - Sustain productive and diverse wildlife habitats.
G - Maximize retention of river-borne sediments and nutrients within coastal wetlands.

Concentrated Assets Table Legend		
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(Continued on Page 3)

Table 2.8a Planning Unit 1: Objectives and Measures Table - Concentrated Assets

	Geographic Location	Current Issues*	Future Risk/Impact	Planning Unit Objective	Coastal Objectives	Measures																													
						61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82								
						Lake Borgne Shoreline Protection at Bayou Dupe	Bayou Bienvenue Pump Station Diversion and Terracing (Deauthorized)	Eden Isles East Marsh Restoration (Deauthorized)	Red Mud Demonstration (Deauthorized)	Benneys Bay Sediment Diversion	Maintain Shoreline Integrity of Lake Pontchartrain	Resolve/Close MRGO to Deep Draft Navigation	Stabilize the Entire North Bank of the MRGO	Dedicated Delivery of Sediment for Marsh Building (Tchefuncte, Tangipahoa and Pearl River Mouths, Eloi Bay, and Biloxi Marshes)	Diversion from Jefferson Parish Drainage into La Branche Wetlands	Provide Diversion-Related Flood Protection where needed in the Upper Basin.	Small (<2,000 cfs) Diversion at Reserve Relief Canal with Outfall Management	Restore St. Tammany Marsh	Reconstruct Madisonville Bulkhead	Improve St. Tammany Parish Drainage	Lake Lery Marsh Restoration and Freshwater Diversion	Mississippi River Delta Management Study	Mississippi River Gulf Outlet Environmental Features and Salinity Control Study	Strategize and Implement Plan to Elevate and/or Relocate Assets Located Outside the Hurricane Protection Plans	Adaptive management through maintenance or existing crevasses and construction of new crevasses/Mississippi River Gulf Outlet Environmental Features and Salinity Control Study.	Maximize beneficial use of dredge material where feasible.	Louisiana/Mississippi hydrodynamic Study								
				Alt 1** Alt 2**										Alt 2					Alt 1, Alt 2	Alt 1, Alt 2	Alt 1, Alt 2	Alt 1, Alt 2	Alt 1, Alt 2	Alt 1, Alt 2											
Concentrated Assets	Florida Parishes and Amite River		High flood risk to Concentrated Assets with storm surges over 25 ft.	Increased flood risk to assets due to sea level rise, subsidence, and wetland loss.	Provide coastal protection to Florida Parishes and Amite River Concentrated Assets.	A																+	+												
	North Shore		High level of flood risk to Concentrated Assets with storm surges over 15 ft.	Increased flood risk to assets due to sea level rise, subsidence, and wetland loss.	Provide coastal protection to North Shore Concentrated Assets.	A			+								+	+	+				+	+											
	New Orleans Metro Area	Reserve/LaPlace	Extremely high flood risk to Concentrated Assets with storm surges over 20 ft.	Increased flood risk to assets due to sea level rise, subsidence, and wetland loss.	Provide coastal protection to Reserve/LaPlace Concentrated assets.	A				+																									
		Norco/St. Rose	Extremely high level of flood risk to Concentrated Assets with storm surges over 20 ft.	CA3	Provide coastal protection to Reserve/LaPlace Concentrated assets.	A						+																							
		JP/NO Eastbank	Extremely high level of flood risk to Concentrated Assets with storm surges over 20 ft.	Increased flood risk to assets due to sea level rise, subsidence, and wetland loss.	Provide coastal protection to JP/NO Eastbank Concentrated Assets.	A							+	+									+				+								
		NO East to Hwy 11	Extremely high flood risk to Concentrated Assets with storm surges over 20 ft.	Increased flood risk due to assets due to sea level rise, subsidence, and wetland loss.	Provide coastal protection to NO East to Hwy 11 Concentrated Assets.	A			+				+	+												+									
		Lower 9th/St. Bernard	Extremely high flood risk to Concentrated Assets with storm surges over 20 ft.	Increased flood risk to assets due to sea level rise, subsidence, and wetland loss.	Provide coastal protection to Lower 9th/St. Bernard Concentrated Assets.	A			+					+										+			+								
	Plaquemines Eastbank		High flood risk to Concentrated Assets with storm surges over 15 ft.	Increased flood risk to assets due to sea level rise, subsidence, and wetland loss.	Provide coastal protection to Plaquemines Eastbank Concentrated Assets.	A																+			+	+	+								
	Coastal Fishing and Recreation (Outside Levees)		Extremely high flood risk to Concentrated Assets with storm surges over 15 ft.	Increased flood risk to assets due to sea level rise, subsidence, and wetland loss.	Provide coastal protection to Coastal Fishing and Recreation Areas outside levees.	A						+										+	+	+	+	+	+								

* Current issues, percent flooded: H = High (25-50%); EH= Extremely High (> 50%)
** Alternative Plan (Measure used in Alternative Plans)

Coastwide Objectives:
A - Reduce storm damage vulnerability of coastal communities, resources, and infrastructure.
B - Minimize exposure of traditional flood protection measures to open Gulf conditions.
C - Increase sediment input from sources outside estuarine basins, and manage existing sediment resources within estuarine basines, to sustain and rejuvenate existing wetlands, rebuild marsh substrate and construct flood protections projects.
D - Maintain or establish natural landscape features and hydrologic processes that are critical to sustainable ecosystems structure and function, including dissipation of storm energy.
E - Establish or maintain dynamic salinity gradients that reflect natural cycles of freshwater availability and marine forcing (fluctuation related to normal daily and seasonal tide action or exchange).
F - Sustain productive and diverse wildlife habitats.
G - Maximize retention of river-borne sediments and nutrients within coastal wetlands.

Concentrated Assets Table Legend		
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Table 2.8b Planning Unit 1: Objectives and Measures Table - Distributed Assets

	Geographic Location	Current Issues*	Future Risk/Impact	Planning Unit Objective	Coastal Objectives	Measures																														
						1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	
						Levee Alignment No. 1 (Alternate East Levee Alignment)	Re-evaluation of south shore of Lake Pontchartrain Levee Alignment and connection to Levee Alignment 1	Open-System Pontchartrain Basin Hurricane Protection Levee Alignment Alternative incl.	Suggested Modification of Lake Pontchartrain Basin Basin	Construct New Floodgate at Bohemia (Mississippi River)	Raise Both Sides of Levees on Mississippi R. (Bohemia to just north of Caernarvon)	Raise 40 Arpent Levee to 17.5' (from Industrial Canal to Verret with tie-in at Verret)	Construct New MRGO Lock and Extend MRGO Eastbank Levee	Enhance Levees along the Intracoastal (north towards Lake Pontchartrain), the GIWW, the Industrial Canal, and the MRGO	Construct a Sill at Seabrook (Industrial Canal at Lake Pontchartrain)	Maintain the MRGO - Lake Borgne Landbridge including Shoreline Protection/Restoration Features	Restore the Bayou LaLoutre Ridge (includes Construction of MRGO to GIWW Dimensions)	Restore the Chandeleur Barrier Islands	Construct the Jefferson Parish Fringe Marsh Buffer	Construct the Violet Reintroduction to Maintain Target Salinity in Louisiana and Mississippi	Maintain and Restore Biloxi Marsh Landbridge and Barrier Reefs - South	Maintain and Restore Biloxi Marsh Landbridge and Barrier Reefs - North	Maintain Critical Marsh Shorelines and Ridges of the East Orleans Landbridge	Modification of Caernarvon Diversion (Maintain Breton Landbridge)	Maintain and Enhance the Maurepas Landbridge with Maurepas Reintroduction	1,000 cfs Diversion at Convent/Blind River	5,000 cfs Diversion at Convent/Blind River	10,000 cfs Diversion at Convent/Blind River	1,000 cfs Diversion at Hope Canal	1,000 cfs Diversion at Reserve Relief Canal	5,000 cfs Diversion at Bonnet Carre Spillway (incl. Diversion into LaBranche Wetlands)	10,000 cfs Diversion at Bonnet Carre Spillway (incl. Diversion into LaBranche Wetlands)	6,000 cfs Diversion at White's Ditch	10,000 cfs Diversion at White's Ditch	15,000 cfs Diversion at American/California Bay	
						Alt 1** Alt 2**	Alt 1, Alt 2									Alt 1, Alt 2	Alt 1, Alt 2	Alt 1, Alt 2	Alt 1, Alt 2	Alt 2	Alt 1, Alt 2	Alt 2	Alt 2	Alt 1, Alt 2		Alt 1, Alt 2			Alt 1, Alt 2					Alt 1, Alt 2		
Distributed Assets	DA1-1 Chandeleur and Breton Sound	High level of flood risk to Distributed Assets with storm surges over 15 ft.	Increased flood risk to assets due to sea level rise, subsidence, and wetland loss.	Provide coastal protection to oil and gas fields and pipelines.	A														+																	
				Reduce storm surge impacts from the MRGO to increase coastal protection.	A	+			+												+															
				Provide coastal protection to strategic assets; US Coast Guard Tower.	A																	+														
	DA1-2 Lake Borgne Area	High level of flood risk to Distributed Assets with storm surges over 15 ft.	Increased flood risk to assets due to sea level rise, subsidence, and wetland loss.	Provide coastal protection to highways and evacuation routes including I-10 and Hwy 11 and Hwy 90.	A	+			+										+		+	+														
				Provide coastal protection to bridges including Twin Span, Hwy 11 bridge, Rigolet Bridge, and Chef Pass Bridge.	A	+			+												+		+	+												
				Provide coastal protection to ports, waterways, and infrastructure. i.e. GIWW.	A	+			+						+						+		+	+	+											
				Reduce storm surge impacts from the MRGO to increase coastal protection.	A	+			+							+																				
	DA1-3 Lake Pontchartrain Area	High level of flood risk to Distributed Assets with storm surges over 25 ft.	Increased flood risk to assets due to sea level rise, subsidence, and wetland loss.	Provide coastal protection to highways and evacuation routes including I-55.	A	+			+										+		+	+														
				Provide coastal protection to the Causeway Bridge.	A	+			+												+		+	+												
	DA1-4 Lake Maurepas Area	High level of flood risk to Distributed Assets with storm surges over 25 ft.	Increased flood risk to assets due to sea level rise, subsidence, and wetland loss.	Provide coastal protection to highways and evacuation routes including I-10 and Hwy 61.	A	+			+										+				+													

* Current issues, percent flooded: H = High (25-50%); EH= Extremely High (> 50%)
** Alternative Plan (Measure used in Alternative Plans)

Coastwide Objectives:
A - Reduce storm damage vulnerability of coastal communities, resources, and infrastructure.
B - Minimize exposure of traditional flood protection measures to open Gulf conditions.
C - Increase sediment input from sources outside estuarine basins, and manage existing sediment resources within estuarine basines, to sustain and rejuvenate existing wetlands, rebuild marsh substrate and construct flood protections projects.
D - Maintain or establish natural landscape features and hydrologic processes that are critical to sustainable ecosystems structure and function, including dissipation of storm energy.
E - Establish or maintain dynamic salinity gradients that reflect natural cycles of freshwater availability and marine forcing (fluctuation related to normal daily and seasonal tide action or exchange).
F - Sustain productive and diverse wildlife habitats.
G - Maximize retention of river-borne sediments and nutrients within coastal wetlands.

Distributed Assets Table Legend		
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(Continued on Page 5)

Table 2.8b Planning Unit 1: Objectives and Measures Table - Distributed Assets

[illegible]

* Current issues, percent flooded: H = High (25-50%); EH= Extremely High (> 50%)

**** Alternative Plan (Measure used in Alternative Plans)**

Coastwide Objectives:

A - Reduce storm damage vulnerability of coastal communities, resources, and infrastructure.

B - Minimize exposure of traditional flood protection measures to open Gulf conditions.

C - Increase sediment input from sources outside estuarine basins, and manage existing sediment resources within estuarine basins, to sustain and rejuvenate existing wetlands, rebuild marsh substrate and construct flood protections projects.

D - Maintain or establish natural landscape features and hydrologic processes that are critical to sustainable ecosystems structure and function, including dissipation of storm energy.

E - Establish or maintain dynamic salinity gradients that reflect natural cycles of freshwater availability and marine forcing (fluctuation related to normal daily and seasonal tide action or exchange).

F - Sustain productive and diverse wildlife habitats.

G - Maximize retention of river-borne sediments and nutrients within coastal wetlands.

Distributed Assets Table Legend		
Page 4	Page 5	Page 6

(Continued on Page 6)

Table 2.8b Planning Unit 1: Objectives and Measures Table - Distributed Assets

	Geographic Location	Current Issues*	Future Risk/Impact	Planning Unit Objective	Coastal Objectives	Measures																													
						61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82								
						Lake Borgne Shoreline Protection at Bayou Dupre	Bayou Bienvenue Pump Station Diversion and Terracing (Deauthorized)	Eden Isles East Marsh Restoration (Deauthorized)	Red Mud Demonstration (Deauthorized)	Berneys Bay Sediment Diversion	Maintain Shoreline Integrity of Lake Pontchartrain	Resolve/Close MRGO to Deep Draft Navigation	Stabilize the Entire North Bank of the MRGO	Dedicated Delivery of Sediment for Marsh Building (Tchefuncte, Tangipahoa, and Pearl River Mouths, Eloi Bay and Biloxi Marshes)	Diversion from Jefferson Parish Drainage into La Branche Wetlands	Provide Diversion-Related Flood Protection where needed in the Upper Basin.	Small (<2,000 cfs) Diversion at Reserve Relief Canal with Outfall Management	Restore St. Tammany Marsh	Reconstruct Madisonville Bulkhead	Improve St. Tammany Parish Drainage	Lake Lery Marsh Restoration and Freshwater Diversion	Mississippi River Delta Management Study	Mississippi River Gulf Outlet Environmental Features and Salinity Control Study	Strategize and Implement Plan to Elevate and/or Relocate Assets Located Outside the Hurricane Protection Plans	Wetland management program maintenance or existing crevasses and construction of new crevasses/Mississippi River Gulf Outlet Environmental Features and Salinity Control Study.	Maximize beneficial use of dredge material where feasible.	Louisiana/Mississippi hydrodynamic Study								
Distributed Assets	DA1-1 Chandeleur and Breton Sound	High level of flood risk to Distributed Assets with storm surges over 15 ft.	Increased flood risk to assets due to sea level rise, subsidence, and wetland loss.	Provide coastal protection to oil and gas fields and pipelines.	A																														
				Reduce storm surge impacts from the MRGO to increase coastal protection.	A																			+	+										
				Provide coastal protection to strategic assets; US Coast Guard Tower.	A																			+											
	DA1-2 Lake Borgne Area	High level of flood risk to Distributed Assets with storm surges over 15 ft.	Increased flood risk to assets due to sea level rise, subsidence, and wetland loss.	Provide coastal protection to highways and evacuation routes including I-10 and Hwy 11 and Hwy 90.	A																	+													
				Provide coastal protection to bridges including Twin Span, Hwy 11 bridge, Rigolet Bridge, and Chef Pass Bridge.	A																			+											
				Provide coastal protection to ports, waterways, and infrastructure. i.e. GIWW.	A	+	+							+		+							+	+			+								
				Reduce storm surge impacts from the MRGO to increase coastal protection.	A									+		+									+	+									
	DA1-3 Lake Pontchartrain Area	High level of flood risk to Distributed Assets with storm surges over 25 ft.	Increased flood risk to assets due to sea level rise, subsidence, and wetland loss.	Provide coastal protection to highways and evacuation routes including I-55.	A										+							+													
				Provide coastal protection to the Causeway Bridge.	A																			+											
	DA1-4 Lake Maurepas Area	High level of flood risk to Distributed Assets with storm surges over 25 ft.	Increased flood risk to assets due to sea level rise, subsidence, and wetland loss.	Provide coastal protection to highways and evacuation routes including I-10 and Hwy 61.	A										+		+	+					+												

* Current issues, percent flooded: H = High (25-50%); EH= Extremely High (> 50%)
** Alternative Plan (Measure used in Alternative Plans)

Coastwide Objectives:
A - Reduce storm damage vulnerability of coastal communities, resources, and infrastructure.
B - Minimize exposure of traditional flood protection measures to open Gulf conditions.
C - Increase sediment input from sources outside estuarine basins, and manage existing sediment resources within estuarine basins, to sustain and rejuvenate existing wetlands, rebuild marsh substrate and construct flood protections projects.
D - Maintain or establish natural landscape features and hydrologic processes that are critical to sustainable ecosystems structure and function, including dissipation of storm energy.
E - Establish or maintain dynamic salinity gradients that reflect natural cycles of freshwater availability and marine forcing (fluctuation related to normal daily and seasonal tide action or exchange).
F - Sustain productive and diverse wildlife habitats.
G - Maximize retention of river-borne sediments and nutrients within coastal wetlands.

Distributed Assets Table Legend		
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Table 2.8c Planning Unit 1: Objectives and Measures Table - Ecosystem Units

	Geographic Location	Current Issues	Future Risk/Impact*	Planning Unit Objective	Coastal Objectives	Measures																														
						1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	
						Levee Alignment No. 1 (Alternate East Levee Alignment)	Re-evaluation of south shore of Lake Pontchartrain Levee Alignment and connection to Levee Alignment 1	Open-System Pontchartrain Basin Hurricane Protection Levee Alignment Alternative Incl.	Suggested Modification of Lake Pontchartrain Basin Basin	Construct New Floodgate at Bohemia (Mississippi River)	Raise Both Sides of Levee on Mississippi R. (Bohemia to just north of Caernarvon)	Raise 40 Arpent Levee to 17.5' (from Industrial Canal to Verret with tie-in at Verret)	Construct New MRGO Lock and Extend MRGO Eastbank Levee	Enhance Levees along the Intracoastal (north towards Lake Pontchartrain), the GIWW, the Industrial Canal, and the MRGO	Construct a Sill at Seabrook (Industrial Canal at Lake Pontchartrain)	Maintain the MRGO - Lake Borgne Landbridge including Shoreline Protection/Restoration Features	Restore the Bayou LaLoutre Ridge (Includes Constriction of MRGO to GIWW Dimensions)	Restore the Chandeleur Barrier Islands	Construct the Jefferson Parish Fringe Marsh Buffer	Construct the Violet Reintroduction to Maintain Target Salinity in Louisiana and Mississippi	Maintain and Restore Biloxi Marsh Landbridge and Barrier Reefs - South	Maintain and Restore Biloxi Marsh Landbridge and Barrier Reefs - North	Maintain Critical Marsh Shorelines and Ridges of the East Orleans Landbridge	Modification of Caernarvon Diversion (Maintain Breton Landbridge)	Maintain and Enhance the Maurepas Landbridge with Maurepas Reintroduction	1,000 cfs Diversion at Convent/Blind River	5,000 cfs Diversion at Convent/Blind River	10,000 cfs Diversion at Convent/Blind River	1,000 cfs Diversion at Hope Canal	1,000 cfs Diversion at Reserve Relief Canal	5,000 cfs Diversion at Bonnet Carre Spillway (incl. Diversion into LaBranche Wetlands)	10,000 cfs Diversion at Bonnet Carre Spillway (incl. Diversion into LaBranche Wetlands)	6,000 cfs Diversion at White's Ditch	10,000 cfs Diversion at White's Ditch	15,000 cfs Diversion at American/California Bay	
Alt 1** , Alt 2**	Alt 1, Alt 2									Alt 1, Alt 2	Alt 1, Alt 2	Alt 1, Alt 2	Alt 1, Alt 2	Alt 2	Alt 1, Alt 2	Alt 2	Alt 1, Alt 2			Alt 1, Alt 2			Alt 1, Alt 2				Alt 1, Alt 2			Alt 1, Alt 2						
Ecosystem Units	EU1-1 Upper Basin Swamps	Function disruption due to subsidence, altered inundation, and sediment disruption.	High loss of swamp and fresh/intermediate habitats, decreased avifauna, decreased fisheries, and moderate reduction in storm attenuation.	Increase sediment, freshwater, and nutrient introduction to Upper Basin Swamps.	C																	+	+	+	+	+	+	+	+	+						
				Improve natural hydrology within the Upper Basin Swamps.	D																			+	+	+	+	+	+	+	+	+				
				Sustain productive fish and wildlife habitats in the Upper Basin Swamps.	F																			+	+	+	+	+	+	+	+	+				
	EU1-2 North and South Shore of Lake Pontchartrain	Function disruption due to subsidence, wave/wake energy, saltwater intrusion, and tidal exchange.	High loss of swamp and fresh/intermediate habitats, decreased avifauna, decreased fisheries, and significant reduction in storm attenuation.	Allow for natural tidal exchange in Lake Pontchartrain.	D, E	+		+	+					+					+	+	+															
				Stabilize shoreline North and South of Lake Pontchartrain.	B													+																		
				Sustain productive fish and wildlife habitats in the north and south shore of Lake Pontchartrain area.	F														+																	
	EU1-3 Orleans Landbridge	Function disruption due to subsidence, wave/wake energy, and altered inundation.	Low loss of fresh/intermediate and brackish/saline habitats, decreased avifauna, decreased fisheries, and reduction in storm attenuation.	Reduce wave/wake energy impacts to Orleans Landbridge.	B											+			+	+	+															
				Sustain productive fish and wildlife habitats in the Orleans Landbridge area.	F	-			-											+		+														
	EU1-4 Southern Lake Borgne Rim Including MRGO	Function disruption due to subsidence, wave/wake energy, saltwater intrusion, sediment disruption, and direct removal.	Moderate loss of brackish/saline habitats, decreased wildlife, decreased fisheries, and moderate reduction in storm attenuation.	Reduce wave/wake energy impacts to the Southern Lake Borgne Rim area.	B											+	+			+	+															
				Increase sediment, freshwater, and nutrient introduction to the Southern Lake Borgne Rim area.	C, G															+																
				Reduce saltwater intrusion into the Southern Lake Borgne Rim area.	E								+			+	+	+		+	+	+														
				Reduce wave/wake energy impacts to areas surrounding MRGO.	B								+			+	+																			
				Reduce storm surge impacts from the MRGO.	A	+			+				+					+																		
				Reduce saltwater intrusion through the MRGO.	E	+							+							+																
				Sustain productive fish and wildlife habitats in the Southern Lake Borgne Rim area.	F	-											+	+	+		+															
	EU1-5 Central Wetlands Including MRGO Disposal Area	Function disruption due to subsidence, wave/wake energy, sediment disruption, and direct removal.	High loss of brackish/saline habitats, decreased wildlife, decreased fisheries, and significant reduction in storm attenuation.	Improve natural hydrology within the Central Wetlands (incl. Bayou la Loutre vicinity).	D	-			-			-		-				+			+															
				Increase sediment, freshwater, and nutrient introduction to the Central Wetlands.	C, G															+			+													
				Sustain productive fish and wildlife habitats in the Central Wetlands.	F	-			-											+			+													
	EU1-6 Upper Breton Marshes	Function disruption due to subsidence, wave/wake energy, sediment disruption, and direct removal.	High loss of fresh and intermediate habitats, and low reduction in storm attenuation.	Reduce wave/wake energy impacts to the Upper Breton Marshes.	B											+				+																
				Increase introduction of sediment, freshwater, and nutrients into Upper Breton Marshes.	C, G	-					-											+										+	+			

(Continued on Page 10)

* Ecosystems Unit Future Risk, percent changed: L= Low Loss (1-15); M = Moderate Loss (16-49); H = High Loss (< 5); Increase (I); Not Applicable (NA); Steady (S); Decrease (D); Increase (I); Unknown (U)
** Alternative Plan (Measure used in Alternative Plans)

Coastwide Objectives:
A - Reduce storm damage vulnerability of coastal communities, resources, and infrastructure.
B - Minimize exposure of traditional flood protection measures to open Gulf conditions.
C - Increase sediment input from sources outside estuarine basins, and manage existing sediment resources within estuarine basines, to sustain and rejuvenate existing wetlands, rebuild marsh substrate and construct flood protections projects.
D - Maintain or establish natural landscape features and hydrologic processes that are critical to sustainable ecosystems structure and function, including dissipation of storm energy.
E - Establish or maintain dynamic salinity gradients that reflect natural cycles of freshwater availability and marine forcing (fluctuation related to normal daily and seasonal tide action or exchange).
F - Sustain productive and diverse wildlife habitats.
G - Maximize retention of river-borne sediments and nutrients within coastal wetlands.

Ecosystem Units Table Legend		
Page 7	Page 8	Page 9
Page 10	Page 11	Page 12

Table 2.8c Planning Unit 1: Objectives and Measures Table - Ecosystem Units

	Geographic Location	Current Issues	Future Risk/Impact*	Planning Unit Objective	Coastal Objectives	Measures																													
						31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
						110,000 cfs Diversion at American/California Bay with \$	250,000 cfs Diversion at American/California Bay with Sediment Enrichment	12,000 cfs Diversion at Bayou Lamoque	15,000 cfs Diversion at Fort St. Phillip	26,000 cfs Diversion at Fort St. Phillip with Sediment En	52,000 cfs Diversion at Fort St. Phillip with Sediment Enrichment	Sediment Delivery by Pipeline at American/California Bay	Sediment Delivery by Pipeline at Central Wetlands	Sediment Delivery by Pipeline at Fort St. Phillips	Sediment Delivery by Pipeline at Golden Triangle	Sediment Delivery by Pipeline at LaBranche	Sediment Delivery by Pipeline at Quarantine Bay	Increase Arnette River Influence by Gapping Dredged Material Banks on Diversion Canals	Remove Old Grand Prairie Levee	Add New Bank Line Stabilization (Lake Borgne Corner at GWW to Verret)	Add Breakwater (in Lake Borgne from Southwest Corner to Bixio Wildlife Management Area)	Resolve/Close the MRGO to Deep Draft Navigation	Create Marsh in Interior Open Water Areas and Install Shore Protection Features on the North Shore of Lake Pontchartrain.	Construct 3 or 4 Small Mississippi River Spillways through the Protected Corridor between Carlisle and Bohemia.	Remove the Gates from the Existing Bayou Lamoque Diversion Structure.	Construct two 5,000 cfs Diversions into the Maurepas Swamps	Construct a Band of Marsh Across the Basin from Point a-la-Hache Northeastward to MRGO Spoilbank at the Heads of the Major Bays and Lakes.	Goose Point / Point Platte Marsh Creation	LaBranche Wetlands Terracing, Planting, Shoreline Protection	Pass-a-Loutre Crevasse (Deauthorized)	Periodic Introduction of Sediment and Nutrients at Selected Diversion Sites Demonstration (half in PU-1)	Mississippi River Sediment Trap (half in PU-1)			
						Alt 2**						Alt 1	Alt 1		Alt 1	Alt 1		Alt 1, Alt 2			Alt 1		Alt 1	Alt 2	Alt 1, Alt 2						Alt 1				
Ecosystem Units	EU1-1 Upper Basin Swamps	Function disruption due to subsidence, altered inundation, and sediment disruption.	High loss of swamp and fresh/intermediate habitats, decreased avifauna, decreased fisheries, and moderate reduction in storm attenuation.	Increase sediment, freshwater, and nutrient introduction to Upper Basin Swamps.	C									+		+		+								+		+							
				Improve natural hydrology within the Upper Basin Swamps.	D												+		+								+								
				Sustain productive fish and wildlife habitats in the Upper Basin Swamps.	F										+		+		+								+		+						
	EU1-2 North and South Shore of Lake Pontchartrain	Function disruption due to subsidence, wave/wake energy, saltwater intrusion, and tidal exchange.	High loss of swamp and fresh/intermediate habitats, decreased avifauna, decreased fisheries, and significant reduction in storm attenuation.	Allow for natural tidal exchange in Lake Pontchartrain.	D, E																														
				Stabilize shoreline North and South of Lake Pontchartrain.	B																	+						+							
				Sustain productive fish and wildlife habitats in the north and south shore of Lake Pontchartrain area.	F																		+						+						
	EU1-3 Orleans Landbridge	Function disruption due to subsidence, wave/wake energy, and altered inundation.	Low loss of fresh/intermediate and brackish/saline habitats, decreased avifauna, decreased fisheries, and reduction in storm attenuation.	Reduce wave/wake energy impacts to Orleans Landbridge.	B																														
				Sustain productive fish and wildlife habitats in the Orleans Landbridge area.	F																														
	EU1-4 Southern Lake Borgne Rim Including MRGO	Function disruption due to subsidence, wave/wake energy, saltwater intrusion, sediment disruption, and direct removal.	Moderate loss of brackish/saline habitats, decreased wildlife, decreased fisheries, and moderate reduction in storm attenuation.	Reduce wave/wake energy impacts to the Southern Lake Borgne Rim area.	B									+							+	+	+												
				Increase sediment, freshwater, and nutrient introduction to the Southern Lake Borgne Rim area.	C, G											+							+												
				Reduce saltwater intrusion into the Southern Lake Borgne Rim area.	E											+						+	+	+											
				Reduce wave/wake energy impacts to areas surrounding MRGO.	B											+						+	+	+											
				Reduce storm surge impacts from the MRGO.	A																			+											
				Reduce saltwater intrusion through the MRGO.	E																			+											
				Sustain productive fish and wildlife habitats in the Southern Lake Borgne Rim area.	F											+						+	+												
	EU1-5 Central Wetlands Including MRGO Disposal Area	Function disruption due to subsidence, wave/wake energy, sediment disruption, and direct removal.	High loss of brackish/saline habitats, decreased wildlife, decreased fisheries, and significant reduction in storm attenuation.	Improve natural hydrology within the Central Wetlands (incl. Bayou la Loutre vicinity).	D												+																		
				Increase sediment, freshwater, and nutrient introduction to the Central Wetlands.	C, G									+				+																	
Sustain productive fish and wildlife habitats in the Central Wetlands.				F										+				+																	
EU1-6 Upper Breton Marshes	Function disruption due to subsidence, wave/wake energy, sediment disruption, and direct removal.	High loss of fresh and intermediate habitats, and low reduction in storm attenuation.	Reduce wave/wake energy impacts to the Upper Breton Marshes.	B																										+					
			Increase introduction of sediment, freshwater, and nutrients into Upper Breton Marshes.	C, G																				+					+						

(Continued on Page 9)

* Ecosystems Unit Future Risk, percent changed: L= Low Loss (1-15); M = Moderate Loss (16-49); H = High Loss (< 5); Increase (I); Not Applicable (NA); Steady (S); Decrease (D); Increase (I); Unknown (U)

Coastwide Objectives:

- A - Reduce storm damage vulnerability of coastal communities, resources, and infrastructure.
- B - Minimize exposure of traditional flood protection measures to open Gulf conditions.
- C - Increase sediment input from sources outside estuarine basins, and manage existing sediment resources within estuarine basins, to sustain and rejuvenate existing wetlands, rebuild marsh substrate and construct flood protections projects.
- D - Maintain or establish natural landscape features and hydrologic processes that are critical to sustainable ecosystems structure and function, including dissipation of storm energy.
- E - Establish or maintain dynamic salinity gradients that reflect natural cycles of freshwater availability and marine forcing (fluctuation related to normal daily and seasonal tide action or exchange).
- F - Sustain productive and diverse wildlife habitats.
- G - Maximize retention of river-borne sediments and nutrients within coastal wetlands.

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Table 2.8c Planning Unit 1: Objectives and Measures Table - Ecosystem Units

	Geographic Location	Current Issues	Future Risk/Impact*	Planning Unit Objective	Coastal Objectives	Measures																														
						61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82									
						Lake Borgne Shoreline Protection at Bayou Dupre	Bayou Bienvenue Pump Station Diversion and Terracing (Deauthorized)	Eden Isles East Marsh Restoration (Deauthorized)	Red Mud Demonstration (Deauthorized)	Benneys Bay Sediment Diversion	Maintain Shoreline Integrity of Lake Pontchartrain	Resolve/Close MRGO to Deep Draft Navigation	Stabilize the Entire North Bank of the MRGO	Dedicated Delivery of Sediment for Marsh Building (Tchefuncte, Tangipahoa, and Pearl River Mouths, Eloi Bay and Biloxi Marshes)	Diversion from Jefferson Parish Drainage into La Branche Wetlands	Provide Diversion-Related Flood Protection where needed in the Upper Basin.	Small (<2,000 cfs) Diversion at Reserve Relief Canal with Outfall Management	Restore St. Tammany Marsh	Reconstruct Madisonville Bulkhead	Improve St. Tammany Parish Drainage	Lake Lery Marsh Restoration and Freshwater Diversion	Mississippi River Delta Management Study	Mississippi River Gulf Outlet Environmental Features and Salinity Control Study	Strategize and Implement Plan to Elevate and/or Relocate Assets Located Outside the Hurricane Protection Plans	Adaptive management program maintenance or existing crevasses and construction of new crevasses/Mississippi River Gulf Outlet Environmental Features and Salinity Control Study.	Maximize beneficial use of dredge material where feasible.	Louisiana/Mississippi Hydrodynamic Study.									
Ecosystem Units	EU1-1 Upper Basin Swamps	Function disruption due to subsidence, altered inundation, and sediment disruption.	High loss of swamp and fresh/intermediate habitats, decreased avifauna, decreased fisheries, and moderate reduction in storm attenuation.	Increase sediment, freshwater, and nutrient introduction to Upper Basin Swamps.	C										+		+				+															
				Improve natural hydrology within the Upper Basin Swamps.	D												+		+				+													
				Sustain productive fish and wildlife habitats in the Upper Basin Swamps.	F												+		+				+													
	EU1-2 North and South Shore of Lake Pontchartrain	Function disruption due to subsidence, wave/wake energy, saltwater intrusion, and tidal exchange.	High loss of swamp and fresh/intermediate habitats, decreased avifauna, decreased fisheries, and significant reduction in storm attenuation.	Allow for natural tidal exchange in Lake Pontchartrain.	D, E																															
				Stabilize shoreline North and South of Lake Pontchartrain.	B			+			+			+			+	+																		
				Sustain productive fish and wildlife habitats in the north and south shore of Lake Pontchartrain area.	F			+						+			+																			
	EU1-3 Orleans Landbridge	Function disruption due to subsidence, wave/wake energy, and altered inundation.	Low loss of fresh/intermediate and brackish/saline habitats, decreased avifauna, decreased fisheries, and reduction in storm attenuation.	Reduce wave/wake energy impacts to Orleans Landbridge.	B					+			+																							
				Sustain productive fish and wildlife habitats in the Orleans Landbridge area.	F																															
	EU1-4 Southern Lake Borgne Rim Including MRGO	Function disruption due to subsidence, wave/wake energy, saltwater intrusion, sediment disruption, and direct removal.	Moderate loss of brackish/saline habitats, decreased wildlife, decreased fisheries, and moderate reduction in storm attenuation.	Reduce wave/wake energy impacts to the Southern Lake Borgne Rim area.	B	+	+					+									+															
				Increase sediment, freshwater, and nutrient introduction to the Southern Lake Borgne Rim area.	C, G		+															+														
				Reduce saltwater intrusion into the Southern Lake Borgne Rim area.	E		+						+									+														
				Reduce wave/wake energy impacts to areas surrounding MRGO.	B	+	+						+									+														
				Reduce storm surge impacts from the MRGO.	A								+									+														
				Reduce saltwater intrusion through the MRGO.	E								+									+														
				Sustain productive fish and wildlife habitats in the Southern Lake Borgne Rim area.	F		+						+									+														
	EU1-5 Central Wetlands Including MRGO Disposal Area	Function disruption due to subsidence, wave/wake energy, sediment disruption, and direct removal.	High loss of brackish/saline habitats, decreased wildlife, decreased fisheries, and significant reduction in storm attenuation.	Improve natural hydrology within the Central Wetlands (incl. Bayou la Loutre vicinity).	D																+															
				Increase sediment, freshwater, and nutrient introduction to the Central Wetlands.	C, G																	+														
				Sustain productive fish and wildlife habitats in the Central Wetlands.	F								+									+														
	EU1-6 Upper Breton Marshes	Function disruption due to subsidence, wave/wake energy, sediment disruption, and direct removal.	High loss of fresh and intermediate habitats, and low reduction in storm attenuation.	Reduce wave/wake energy impacts to the Upper Breton Marshes.	B																															
				Increase introduction of sediment, freshwater, and nutrients into Upper Breton Marshes.	C, G																															

(Continued on Page12)

* Ecosystems Unit Future Risk, percent changed: L= Low Loss (1-15); M = Moderate Loss (16-49); H = High Loss (< 5); Increase (I); Not Applicable (NA); Steady (S); Decrease (D); Increase (I); Unknown (U)
** Alternative Plan (Measure used in Alternative Plans)

Coastwide Objectives:
A - Reduce storm damage vulnerability of coastal communities, resources, and infrastructure.
B - Minimize exposure of traditional flood protection measures to open Gulf conditions.
C - Increase sediment input from sources outside estuarine basins, and manage existing sediment resources within estuarine basines, to sustain and rejuvenate existing wetlands, rebuild marsh substrate and construct flood protections projects.
D - Maintain or establish natural landscape features and hydrologic processes that are critical to sustainable ecosystems structure and function, including dissipation of storm energy.
E - Establish or maintain dynamic salinity gradients that reflect natural cycles of freshwater availability and marine forcing (fluctuation related to normal daily and seasonal tide action or exchange).
F - Sustain productive and diverse wildlife habitats.
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Ecosystem Units Table Legend		
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Table 2.8c Planning Unit 1: Objectives and Measures Table - Ecosystem Units

	Geographic Location	Current Issues	Future Risk/Impact*	Planning Unit Objective	Coastal Objectives	Measures																														
						1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	
						Levee Alignment No. 1 (Alternate East Levee Alignment)	Re-evaluation of south shore of Lake Pontchartrain Levee Alignment and connection to Levee Alignment 1	Open-System Pontchartrain Basin Hurricane Protection Levee Alignment Alternative Incl.	Suggested Modification of Lake Pontchartrain Basin Ba	Construct New Floodgate at Bohemia (Mississippi River)	Raise Both Sides of Levee on Mississippi R. (Bohemia to just north of Caernarvon)	Raise 40 Arpent Levee to 17.5' (from Industrial Canal to Verret with tie-in at Verret)	Construct New MRGO Lock and Extend MRGO Eastbank Levee	Enhance Levees along the Intracoastal (north towards Lake Pontchartrain), the GIWW, the Industrial Canal, and the MRGO	Construct a Sill at Seabrook (Industrial Canal at Lake Pontchartrain)	Maintain the MRGO - Lake Borgne Landbridge including Shoreline Protection/Restoration Features	Restore the Bayou LaLoutre Ridge (Includes Constriction of MRGO to GIWW Dimensions)	Restore the Chandeleur Barrier Islands	Construct the Jefferson Parish Fringe Marsh Buffer	Construct the Violet Reintroduction to Maintain Target Salinity in Louisiana and Mississippi	Maintain and Restore Biloxi Marsh Landbridge and Barrier Reefs - South	Maintain and Restore Biloxi Marsh Landbridge and Barrier Reefs - North	Maintain Critical Marsh Shorelines and Ridges of the East Orleans Landbridge	Modification of Caernarvon Diversion (Maintain Breton Landbridge)	Maintain and Enhance the Maurepas Landbridge with Maurepas Reintroduction	1,000 cfs Diversion at Convent/Blind River	5,000 cfs Diversion at Convent/Blind River	10,000 cfs Diversion at Convent/Blind River	1,000 cfs Diversion at Hope Canal	1,000 cfs Diversion at Reserve Relief Canal	5,000 cfs Diversion at Bonnet Carre Spillway (incl. Diversion into LaBranche Wetlands)	10,000 cfs Diversion at Bonnet Carre Spillway (incl. Diversion into LaBranche Wetlands)	6,000 cfs Diversion at White's Ditch	10,000 cfs Diversion at White's Ditch	15,000 cfs Diversion at American/California Bay	
Alt 1** , Alt 2**	Alt 1, Alt 2										Alt 1, Alt 2	Alt 1, Alt 2	Alt 1, Alt 2	Alt 1, Alt 2	Alt 2	Alt 1, Alt 2	Alt 2	Alt 2	Alt 1, Alt 2		Alt 1, Alt 2			Alt 1, Alt 2					Alt 1, Alt 2							
Ecosystem Units	EU1-7 Fringing Marshes	Function disruption due to subsidence, wave/wake energy, sediment disruption, and direct removal.	Moderate loss of brackish/saline habitats, decreased fisheries, and moderate reduction in storm attenuation.	Reduce wave/wake energy impacts to the Fringing Marshes.	B																															
				Increase introduction of sediment, freshwater, and nutrients into the Fringing Marshes.	C, G																															+
				Improve natural hydrology within the Fringing Marshes	D																															+
				Sustain productive fish and wildlife habitats in the Fringing Marshes.	F																															+
	EU1-8 Biloxi Marshes	Function disruption due to subsidence, wave/wake energy, sediment disruptions, and direct removal.	Moderate loss of brackish/saline habitats, decreased wildlife, decreased fisheries, and significant reduction in storm attenuation.	Reduce wave/wake energy impacts to the Biloxi Marshes.	B																															
				Increase introduction of sediment, freshwater into Biloxi Marshes.	C, G																															
				Sustain productive fish and wildlife habitats in the Biloxi Marshes.	F																															
	EU1-9 Barrier Chain and Sound	Function disruption due to subsidence and wave/wake energy.	High loss of land mass and habitat and moderate reduction in storm attenuation.	Maintain storm attenuation characteristics of the Barrier Islands.	A, B																															
				Maintain the ecosystem functions of the Barrier Islands.	A, C, D, E, F																															
				Sustain productive fish and wildlife habitats in the Barrier Chain and Sound.	F																															
	EU1-10 Delta	Function disruption due to subsidence, wave/wake energy, sediment disruption, saltwater intrusion, and tidal exchange.	High loss of fresh and intermediate habitats, decreased avifauna, decreased fisheries, and moderate reduction in storm attenuation.	Restore Delta building processes.	C, D, G																															
				Sustain productive fish and wildlife habitats in the Delta.	F																															

* Ecosystems Unit Future Risk, percent changed: L= Low Loss (1-15); M = Moderate Loss (16-49); H = High Loss (> 5); Increase (I); Not Applicable (NA); Steady (S); Decrease (D); Increase (I); Unknown (U)
** Alternative Plan (Measure used in Alternative Plans)

Coastwide Objectives:
A - Reduce storm damage vulnerability of coastal communities, resources, and infrastructure.
B - Minimize exposure of traditional flood protection measures to open Gulf conditions.
C - Increase sediment input from sources outside estuarine basins, and manage existing sediment resources within estuarine basines, to sustain and rejuvenate existing wetlands, rebuild marsh substrate and construct flood protections projects.
D - Maintain or establish natural landscape features and hydrologic processes that are critical to sustainable ecosystems structure and function, including dissipation of storm energy.
E - Establish or maintain dynamic salinity gradients that reflect natural cycles of freshwater availability and marine forcing (fluctuation related to normal daily and seasonal tide action or exchange).
F - Sustain productive and diverse wildlife habitats.
G - Maximize retention of river-borne sediments and nutrients within coastal wetlands.

Ecosystem Units Table Legend		
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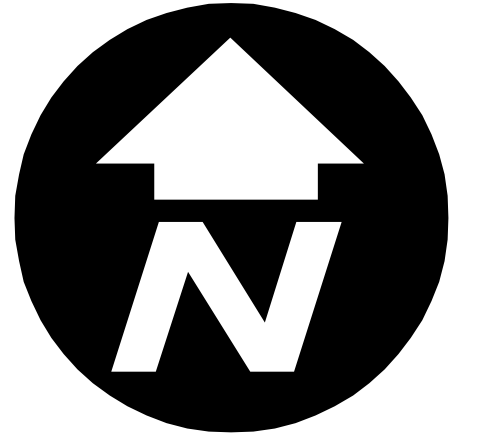
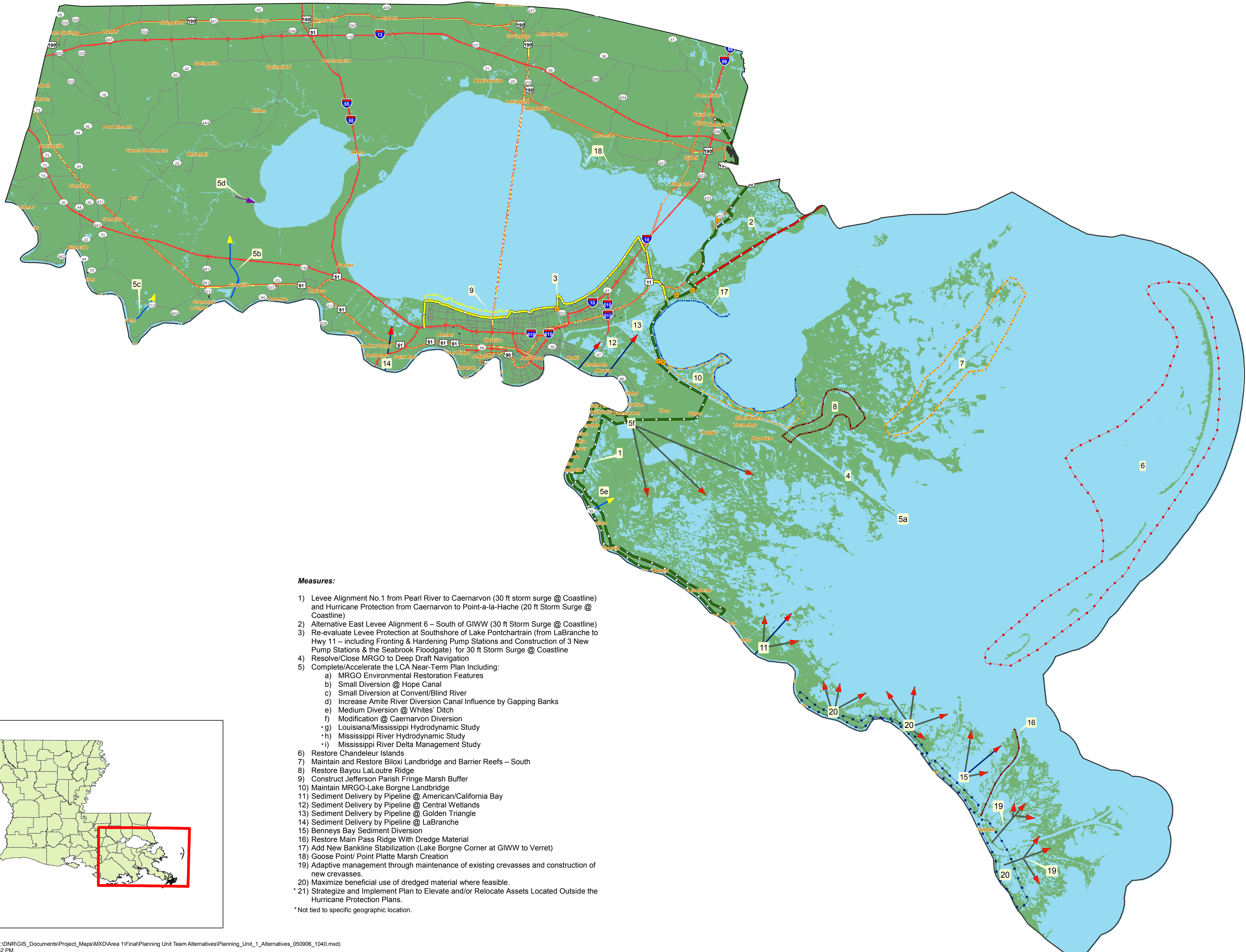
Table 2.8c Planning Unit 1: Objectives and Measures Table - Ecosystem Units

	Geographic Location	Current Issues	Future Risk/Impact*	Planning Unit Objective	Coastal Objectives	Measures																													
						31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
						110,000 cfs Diversion at American/California Bay with	250,000 cfs Diversion at American/California Bay with Sediment Enrichment	12,000 cfs Diversion at Bayou Lamoque	15,000 cfs Diversion at Fort St. Phillip	26,000 cfs Diversion at Fort St. Phillip with Sediment En	52,000 cfs Diversion at Fort St. Phillip with Sediment Enrichment	Sediment Delivery by Pipeline at American/California Bay	Sediment Delivery by Pipeline at Central Wetlands	Sediment Delivery by Pipeline at Fort St. Phillips	Sediment Delivery by Pipeline at Golden Triangle	Sediment Delivery by Pipeline at LaBranche	Sediment Delivery by Pipeline at Quarantine Bay	Increase Amite River Influence by Gapping Dredged Material Banks on Diversion Canals	Reaminate Vieux-Ste-Henri and Postmodernization Change for the Diversion of Water through Inner Harbor Navigation Canal for Enhanced Influence to the Coastal Wetlands	Opportunistic Use of the Bonnet Carré Spillway	Restore Main Pass Ridge with Dredge Material	Remove Old Grand Prairie Levee	Add New Bank Line Stabilization (Lake Borgne Corner at GWW to Verret)	Add Breakwater (in Lake Borgne from Southwest Corner to Biloxi Wildlife Management Area)	Resolve/Close the MRGO to Deep Draft Navigation	Create Marsh in Interior Open Water Areas and Install Shore Protection Features on the North Shore of Lake Pontchartrain.	Construct 3 or 4 Small Mississippi River Spillways through the Protected Corridor between Carlisle and Bohemia.	Remove the Gates from the Existing Bayou Lamoque Diversion Structure.	Construct two 5,000 cfs Diversions into the Maurepas Swamps	Construct a Band of Marsh Across the Basin from Point a-la-Hache Northeastward to MRGO Spillbank at the Heads of the Major Bays and Lakes.	Goose Point / Point Platte Marsh Creation	LaBranche Wetlands Terracing, Planting, Shoreline Protection	Pass-a-Louise Crevasse (Deauthorized)	Periodic Introduction of Sediment and Nutrients at Selected Diversion Sites Demonstration (half in PU-1)	Mississippi River Sediment Trap (half in PU-1)
						Alt 2**						Alt 1	Alt 1		Alt 1	Alt 1		Alt 1, Alt 2			Alt 1		Alt 1	Alt 2	Alt 1, Alt 2							Alt 1			
Ecosystem Units	EU1-7 Fringing Marshes	Function disruption due to subsidence, wave/wake energy, sediment disruption, and direct removal.	Moderate loss of brackish/saline habitats, decreased fisheries, and moderate reduction in storm attenuation.	Reduce wave/wake energy impacts to the Fringing Marshes.	B	+	+			+	+	+		+			+			+												+			
				Increase introduction of sediment, freshwater, and nutrients into the Fringing Marshes.	C, G	+	+	+	+	+	+	+		+			+				+						+		+					+	
				Improve natural hydrology within the Fringing Marshes	D	+	+	+	+	+	+								+	+			+				+		+					+	
				Sustain productive fish and wildlife habitats in the Fringing Marshes.	F	+	+	+	+	+	+	+		+			+				+		+				+		+					+	
	EU1-8 Biloxi Marshes	Function disruption due to subsidence, wave/wake energy, sediment disruptions, and direct removal.	Moderate loss of brackish/saline habitats, decreased wildlife, decreased fisheries, and significant reduction in storm attenuation.	Reduce wave/wake energy impacts to the Biloxi Marshes.	B																														
				Increase introduction of sediment, freshwater into Biloxi Marshes.	C, G																														
				Sustain productive fish and wildlife habitats in the Biloxi Marshes.	F																														
	EU1-9 Barrier Chain and Sound	Function disruption due to subsidence and wave/wake energy.	High loss of land mass and habitat and moderate reduction in storm attenuation.	Maintain storm attenuation characteristics of the Barrier Islands.	A, B																														
				Maintain the ecosystem functions of the Barrier Islands.	A, C, D, E, F																														
				Sustain productive fish and wildlife habitats in the Barrier Chain and Sound.	F															+															
	EU1-10 Delta	Function disruption due to subsidence, wave/wake energy, sediment disruption, saltwater intrusion, and tidal exchange.	High loss of fresh and intermediate habitats, decreased avifauna, decreased fisheries, and moderate reduction in storm attenuation.	Restore Delta building processes.	C, D, G																										+		+		
				Sustain productive fish and wildlife habitats in the Delta.	F						+									+												+		+	

* Ecosystems Unit Future Risk, percent changed: L= Low Loss (1-15); M = Moderate Loss (16-49); H = High Loss (> 50); Increase (I); Not Applicable (NA); Steady (S); Decrease (D); Increase (I); Unknown (U)
** Alternative Plan (Measure used in Alternative Plans)

Coastwide Objectives:
A - Reduce storm damage vulnerability of coastal communities, resources, and infrastructure.
B - Minimize exposure of traditional flood protection measures to open Gulf conditions.
C - Increase sediment input from sources outside estuarine basins, and manage existing sediment resources within estuarine basines, to sustain and rejuvenate existing wetlands, rebuild marsh substrate and construct flood protections projects.
D - Maintain or establish natural landscape features and hydrologic processes that are critical to sustainable ecosystems structure and function, including dissipation of storm energy.
E - Establish or maintain dynamic salinity gradients that reflect natural cycles of freshwater availability and marine forcing (fluctuation related to normal daily and seasonal tide action or exchange).
F - Sustain productive and diverse wildlife habitats.
G - Maximize retention of river-borne sediments and nutrients within coastal wetlands.

Ecosystem Units Table Legend		
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0 4.5 9 13.5
Miles

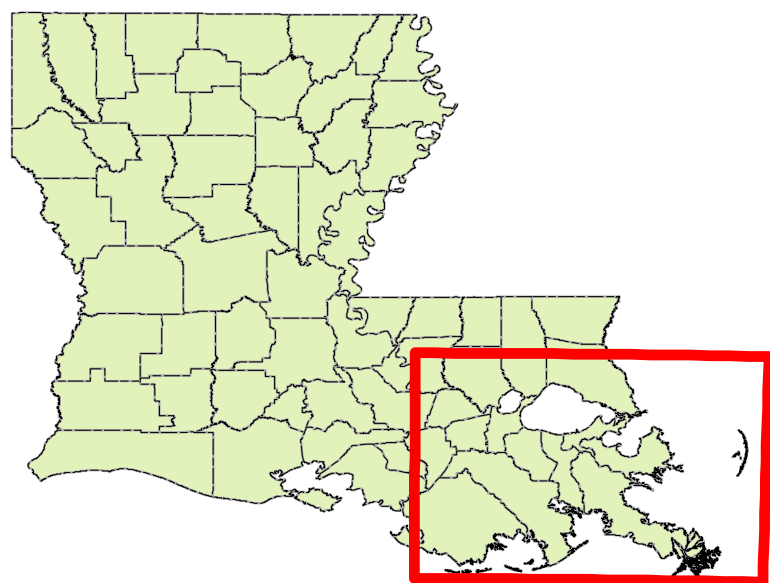
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1 inch equals 5.5 miles

Legend

- Flood Gate
- Levee Alignment No. 1
- Levee Alignment No. 2
- Levee Alignment No. 3
- Diversion
- Bank Gapping
- Barrier Island Restoration
- Land Bridge Restoration
- Bankline Stabilization
- Ridge Restoration
- Marsh Buffer Creation
- Beneficial Use of Dredged Material
- Sediment Diversion

Measures:

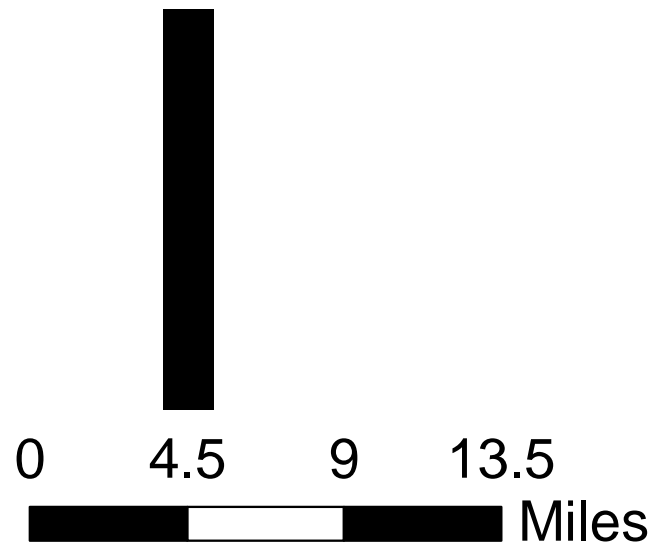
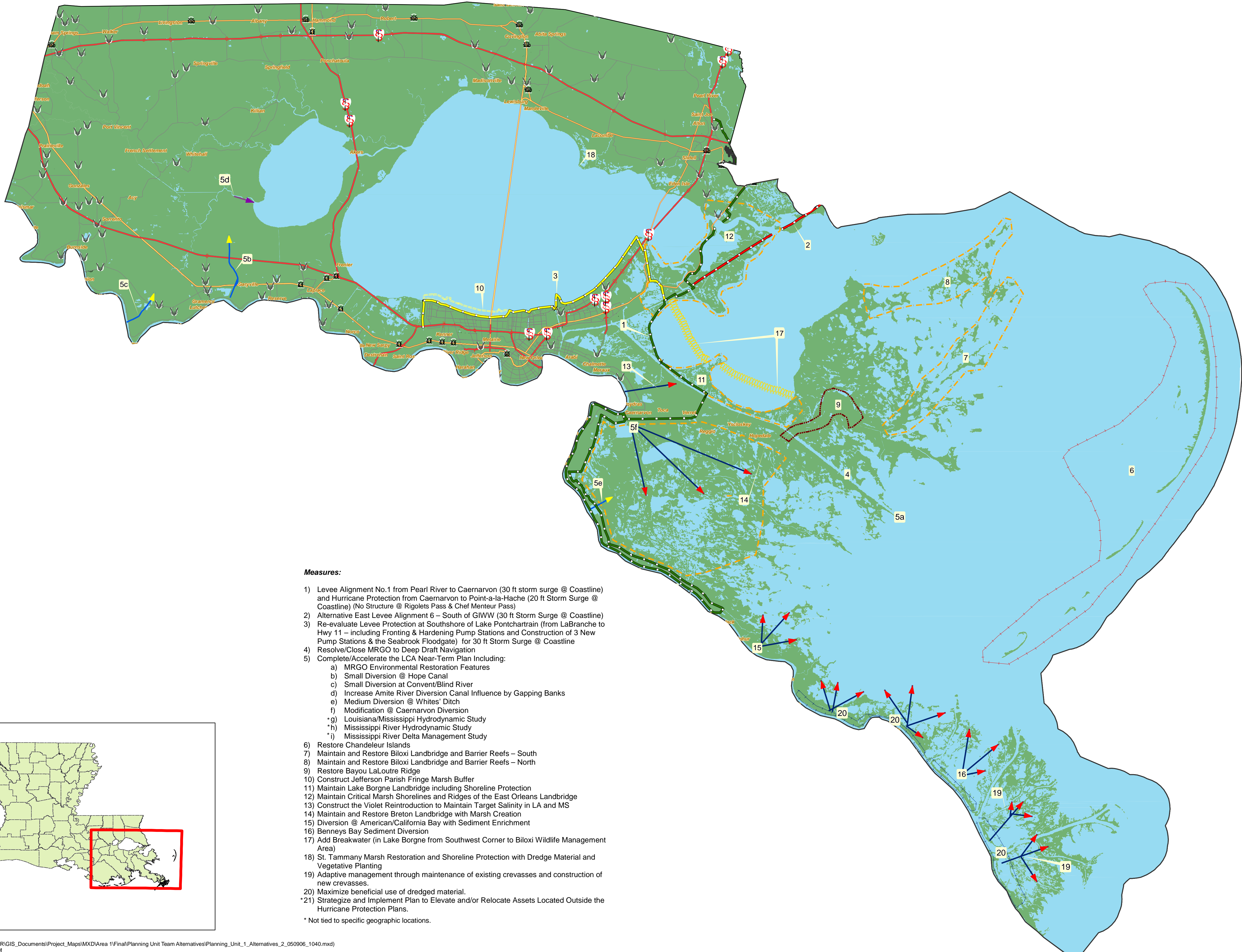
- Levee Alignment No. 1 from Pearl River to Caernarvon (30 ft storm surge @ Coastline) and Hurricane Protection from Caernarvon to Point-a-la-Hache (20 ft Storm Surge @ Coastline)
 - Alternative East Levee Alignment 6 – South of GIWW (30 ft Storm Surge @ Coastline)
 - Re-evaluate Levee Protection at Southshore of Lake Pontchartrain (from LaBranche to Hwy 11 – including Fronting & Hardening Pump Stations and Construction of 3 New Pump Stations & the Seabrook Floodgate) for 30 ft Storm Surge @ Coastline
 - Resolve/Close MRGO to Deep Draft Navigation
 - Complete/Accelerate the LCA Near-Term Plan Including:
 - MRGO Environmental Restoration Features
 - Small Diversion @ Hope Canal
 - Small Diversion at Convent/Blind River
 - Increase Amite River Diversion Canal Influence by Gapping Banks
 - Medium Diversion @ Whites' Ditch
 - Modification @ Caernarvon Diversion
 - Louisiana/Mississippi Hydrodynamic Study
 - Mississippi River Hydrodynamic Study
 - Mississippi River Delta Management Study
 - Restore Chandeleur Islands
 - Maintain and Restore Biloxi Landbridge and Barrier Reefs – South
 - Restore Bayou LaLoutre Ridge
 - Construct Jefferson Parish Fringe Marsh Buffer
 - Maintain MRGO-Lake Borgne Landbridge
 - Sediment Delivery by Pipeline @ American/California Bay
 - Sediment Delivery by Pipeline @ Central Wetlands
 - Sediment Delivery by Pipeline @ Golden Triangle
 - Sediment Delivery by Pipeline @ LaBranche
 - Benneys Bay Sediment Diversion
 - Restore Main Pass Ridge With Dredge Material
 - Add New Bankline Stabilization (Lake Borgne Corner at GIWW to Verret)
 - Goose Point/ Point Platte Marsh Creation
 - Adaptive management through maintenance of existing crevasses and construction of new crevasses.
 - Maximize beneficial use of dredged material where feasible.
 - Strategize and Implement Plan to Elevate and/or Relocate Assets Located Outside the Hurricane Protection Plans.
- * Not tied to specific geographic location.



LOUISIANA COMPREHENSIVE COASTAL
PROTECTION MASTER PLAN

FIGURE 2.4

PLANNING UNIT 1
ALTERNATIVE ONE



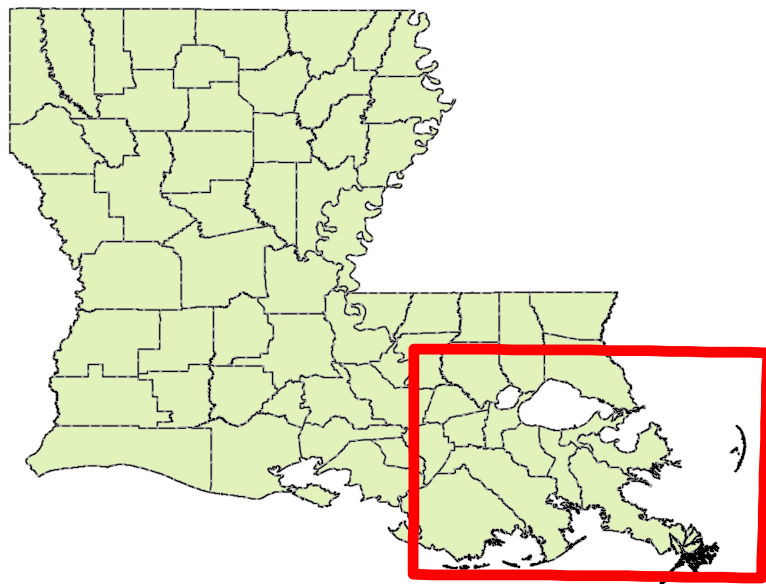
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1 inch equals 5.5 miles

- Legend**
- Flood Gate
 - Levee Alignment No. 1
 - Levee Alignment No. 2
 - Levee Alignment No. 3
 - Diversion
 - Bank Gapping
 - Barrier Island Restoration
 - Land Bridge Restoration
 - Ridge Restoration
 - Marsh Buffer Creation
 - Sediment Diversion
 - Beneficial Use of Dredged Material
 - Breakwaters

Measures:

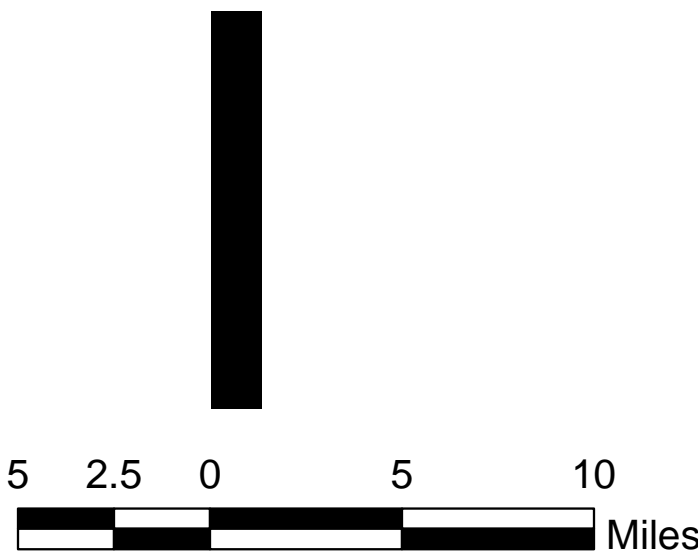
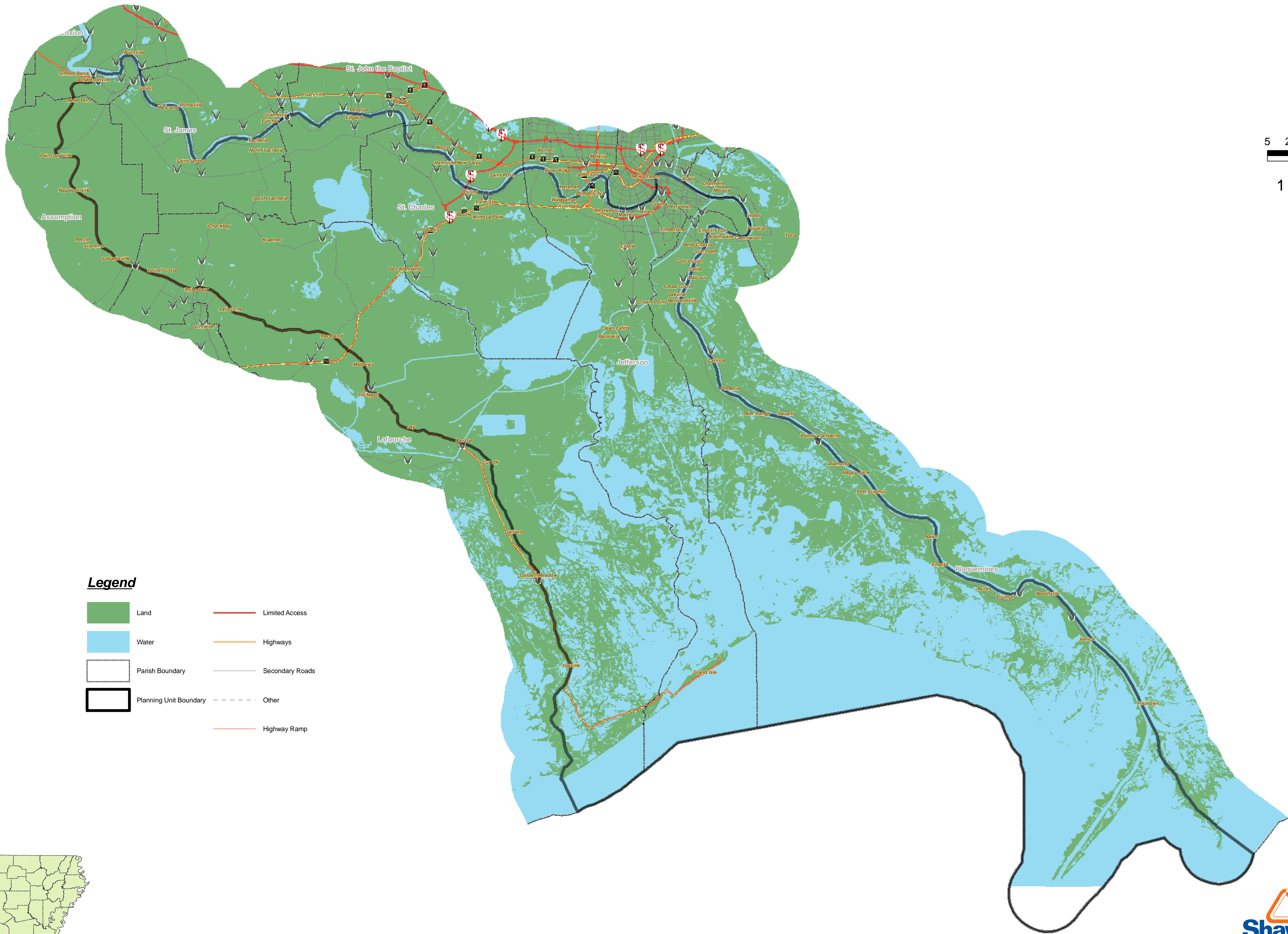
- 1) Levee Alignment No.1 from Pearl River to Caernarvon (30 ft storm surge @ Coastline) and Hurricane Protection from Caernarvon to Point-a-la-Hache (20 ft Storm Surge @ Coastline) (No Structure @ Rigolets Pass & Chef Menteur Pass)
- 2) Alternative East Levee Alignment 6 – South of GIWW (30 ft Storm Surge @ Coastline)
- 3) Re-evaluate Levee Protection at Southshore of Lake Pontchartrain (from LaBranche to Hwy 11 – including Fronting & Hardening Pump Stations and Construction of 3 New Pump Stations & the Seabrook Floodgate) for 30 ft Storm Surge @ Coastline
- 4) Resolve/Close MRGO to Deep Draft Navigation
- 5) Complete/Accelerate the LCA Near-Term Plan Including:
 - a) MRGO Environmental Restoration Features
 - b) Small Diversion @ Hope Canal
 - c) Small Diversion at Convent/Blind River
 - d) Increase Amite River Diversion Canal Influence by Gapping Banks
 - e) Medium Diversion @ Whites' Ditch
 - f) Modification @ Caernarvon Diversion
 - *g) Louisiana/Mississippi Hydrodynamic Study
 - *h) Mississippi River Hydrodynamic Study
 - i) Mississippi River Delta Management Study
- 6) Restore Chandealeur Islands
- 7) Maintain and Restore Biloxi Landbridge and Barrier Reefs – South
- 8) Maintain and Restore Biloxi Landbridge and Barrier Reefs – North
- 9) Restore Bayou LaLoutre Ridge
- 10) Construct Jefferson Parish Fringe Marsh Buffer
- 11) Maintain Lake Borgne Landbridge including Shoreline Protection
- 12) Maintain Critical Marsh Shorelines and Ridges of the East Orleans Landbridge
- 13) Construct the Violet Reintroduction to Maintain Target Salinity in LA and MS
- 14) Maintain and Restore Breton Landbridge with Marsh Creation
- 15) Diversion @ American/California Bay with Sediment Enrichment
- 16) Benneys Bay Sediment Diversion
- 17) Add Breakwater (in Lake Borgne from Southwest Corner to Biloxi Wildlife Management Area)
- 18) St. Tammany Marsh Restoration and Shoreline Protection with Dredge Material and Vegetative Planting
- 19) Adaptive management through maintenance of existing crevasses and construction of new crevasses.
- 20) Maximize beneficial use of dredged material.
- *21) Strategize and Implement Plan to Elevate and/or Relocate Assets Located Outside the Hurricane Protection Plans.

* Not tied to specific geographic locations.



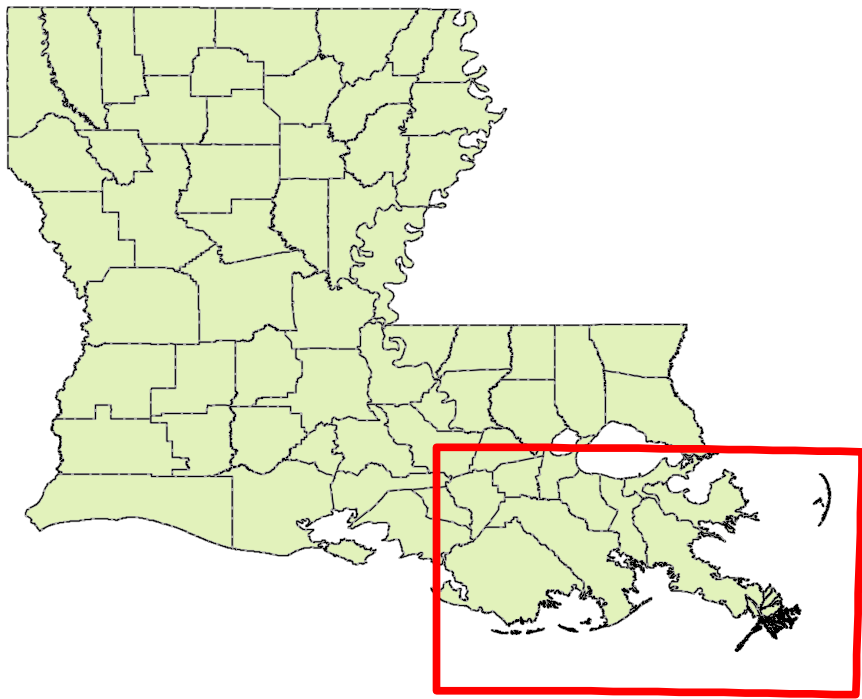
LOUISIANA COMPREHENSIVE COASTAL
PROTECTION MASTER PLAN

FIGURE 2.5
PLANNING UNIT 1
ALTERNATIVE TWO



Legend

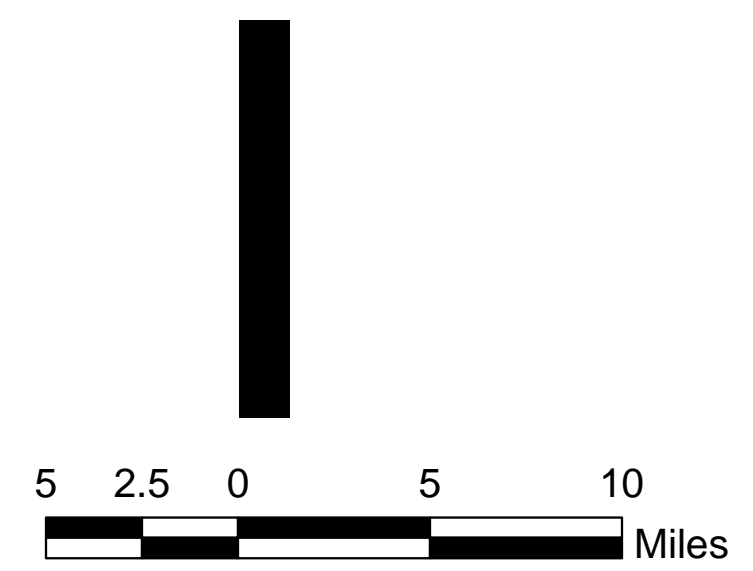
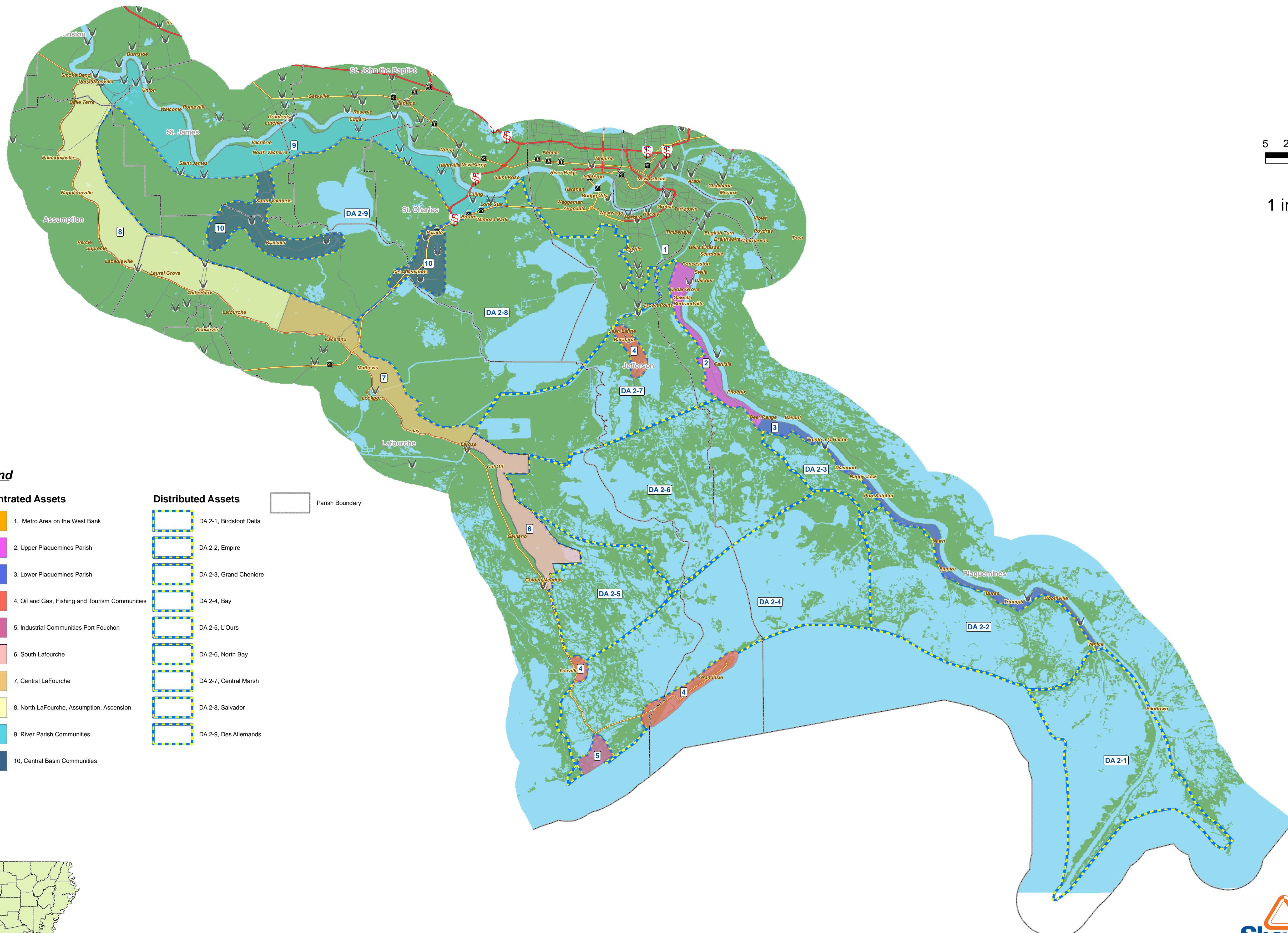
- | | | | |
|--|------------------------|--|-----------------|
| | Land | | Limited Access |
| | Water | | Highways |
| | Parish Boundary | | Secondary Roads |
| | Planning Unit Boundary | | Other |
| | | | Highway Ramp |



LOUISIANA COMPREHENSIVE COASTAL
PROTECTION MASTER PLAN

FIGURE 3.1

PLANNING UNIT 2
BOUNDARY AND BASE MAP



1:316,800
1 inch equals 5 miles

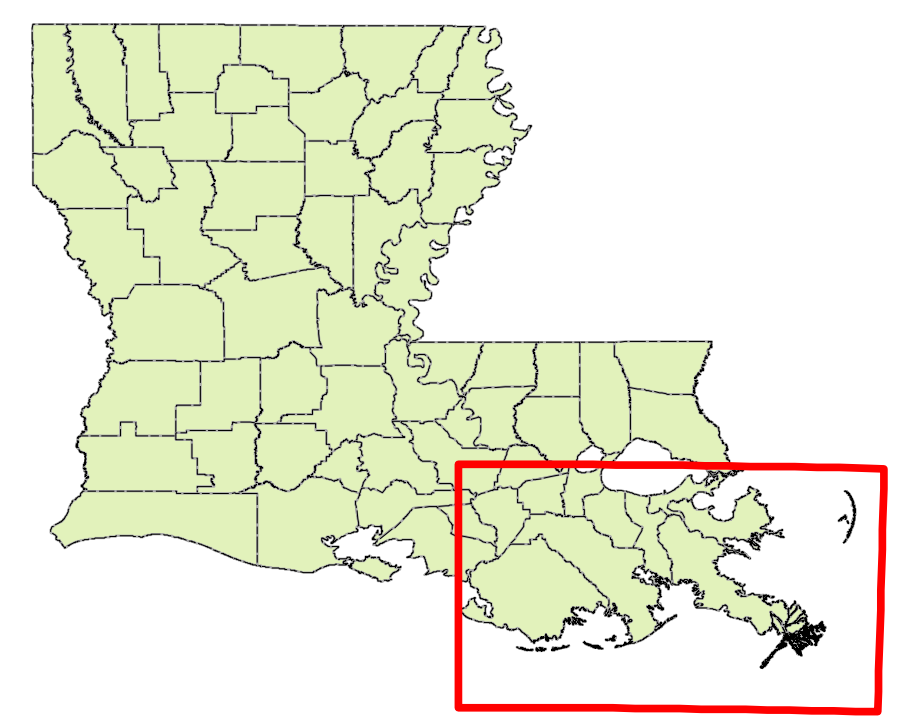
Legend

Concentrated Assets

- 1, Metro Area on the West Bank
- 2, Upper Plaquemines Parish
- 3, Lower Plaquemines Parish
- 4, Oil and Gas, Fishing and Tourism Communities
- 5, Industrial Communities Port Fouchon
- 6, South Lafourche
- 7, Central LaFourche
- 8, North LaFourche, Assumption, Ascension
- 9, River Parish Communities
- 10, Central Basin Communities

Distributed Assets

- DA 2-1, Birdsfoot Delta
- DA 2-2, Empire
- DA 2-3, Grand Cheniere
- DA 2-4, Bay
- DA 2-5, L'Ours
- DA 2-6, North Bay
- DA 2-7, Central Marsh
- DA 2-8, Salvador
- DA 2-9, Des Allemands



LOUISIANA COMPREHENSIVE COASTAL
PROTECTION MASTER PLAN

FIGURE 3.2

**PLANNING UNIT 2
CONCENTRATED AND DISTRIBUTED ASSETS**

PLANNING UNIT 2: West of the Mississippi River to Bayou Lafourche

Table 3.1 Relative Damages from Storm Surge to Concentrated Assets

Proportion of assets damaged or destroyed due to storm surge: EL = Extremely Low (0-5%) L = Low (5 - 15%) M = Medium (15 - 25%) H = High (25 - 50%) EH = Extremely High (>50%)	Storm Surge at Coastline (Feet)	Metro Area on West Bank	Upper Plaquemines Parish	Lower Plaquemines Parish	Oil & Gas, Fishing, and Tourism Communities	Industrial Communities	South LaFourche	Central LaFourche	North LaFourche/ Assumption/ Ascension	River Parish Communities	Cental Basin Communities
	5	EL	EL	EL	M	EL	EL	EL	EL	EL	EL
	10	EL	L	EL	M	L	EL	L	EL	EL	L
	15	M	H	H	EH	M	H	M	L	L	M
	20	EH	EH	EH	EH	EH	EH	EH	H	H	EH
	25	EH	EH	EH	EH	EH	EH	EH	EH	EH	EH
	30	EH	EH	EH	EH	EH	EH	EH	EH	EH	EH

Table 3.2 Concentrated Assets Scoring

Scoring Criteria	Maximum Score for Resource	Metro Area on West Bank	Upper Plaquemines Parish	Lower Plaquemines Parish	Oil & Gas, Fishing, and Tourism Communities	Industrial Communities	South LaFourche	Central LaFourche	North LaFourche/ Assumption/ Ascension	River Parish Communities	Cental Basin Communities
1. Residences	25	25	8	8	8	1	15	12	15	15	12
2. Industry	20	20	3	9	6	5	10	10	10	15	6
3. Infrastructure	15	15	5	5	5	3	8	4	10	10	3
4. Institutional and Publicly Owned Facilities	15	15	3	5	5	1	6	4	8	8	4
5. Strategic Resources	25	25	4	5	4	25	20	4	4	20	1
Total Score	100	100	23	32	28	35	59	34	47	68	26

Table 3.3 Relative Damages from Storm Surge to Distributed Assets¹

Proportion of assets damaged or destroyed due to storm surge: EL = Extremely Low (0-5%) L = Low (5 - 15%) M = Medium (15 - 25%) H = High (25 - 50%) EH = Extremely High (>50%)	Storm Surge at Coastline (Feet)	DA2-1 Birdsfoot Delta	DA2-2 Empire	DA2-3 Grand Cheniere	DA2-4 Bay	DA2-5 L'ours	DA2-6 North Bay	DA2-7 Central Marsh	DA2-8 Salvador	DA2-9 Des Allemands
	5	EL	L	EL	EL	EL	EL	EL	EL	EL
	10	EL	M	EL	L	EL	EL	EL	L	EL
	15	L	H	L	M	L	EL	L	M	L
	20	M	EH	M	H	M	M	M	H	H
	25	H	EH	H	EH	H	H	H	EH	EH
	30	H	EH	H	EH	H	H	H	EH	EH

¹ Assets outside of the defined concentrated areas (see Concentrated and Distributed Assets Map)

Table 3.4 Scoring of Distributed Assets

Scoring Criteria	Maximum Score for Resources	DA2-1 Birdsfoot Delta	DA2-2 Empire	DA2-3 Grand Cheniere	DA2-4 Bay	DA2-5 L'ours	DA2-6 North Bay	DA2-7 Central Marsh	DA2-8 Salvador	DA2-9 Des Allemands
National Significance	25	25	10	5	25	25	20	25	25	15
State Significance	25	15	15	5	25	20	20	25	25	20
Local Significance	25	10	25	0	25	10	20	20	25	25
Critical to Recovery	25	10	5	0	25	15	5	15	20	25
Total Score	100	60	55	10	100	70	65	85	95	85

TABLE 3.5. DISTRIBUTED ASSETS FOR PLANNING UNIT 2

The land outside the defined communities was divided into areas of surge impact commonality. For Planning Unit 2 these are defined by the significant water bodies that impact these areas:

Birdsfoot Delta	= DA 2-1
Empire	= DA 2-2
Grand Cheniere	= DA 2-3
Bay	= DA 2-4
L'ours	= DA 2-5
North Bay	= DA 2-6
Central Marsh	= DA 2-7
Salvador	= DA 2-8
Des Allemand	= DA 2-9

Within these areas following assets are comprised:

	Assets	Oil & Gas	Pipelines	Highway, Bridges & Transportation	Evacuation Routes	Ports, Waterway & Infrastructure	Other Strategic Assets
DA 2-1	Oil & Gas Fields and Pipelines	X	X				
	Southwest Pass					X	
DA 2-2	Oil & Gas Fields and Pipelines	X	X				
	Port Venice					X	
DA 2-3	Oil & Gas Fields and Pipelines	X	X				
DA 2-4	Oil & Gas Fields and Pipelines	X	X				
	LOOP		X				
	Barataria Bay Waterway					X	
	LA 1			X	X		
	Waterline (Lafitte - Grand Isle)						X
DA 2-5	Oil & Gas Fields and Pipelines	X	X				
	LOOP		X				
6	Oil & Gas Fields and Pipelines	X	X				

	Assets	Oil & Gas	Pipelines	Highway, Bridges & Transportation	Evacuation Routes	Ports, Waterway & Infrastructure	Other Strategic Assets
DA 2-6	Barataria Bay Waterway					X	
DA 2-7	Oil & Gas Fields and Pipelines	X	X				
	Barataria Bay Waterway					X	
	GIWW					X	
DA 2-8	Oil & Gas Fields and Pipelines	X	X				
	GIWW					X	
	Bayou des Allemands					X	
	Hwy 90 (Future I-49)			X	X		
DA 2-9	Oil & Gas Fields and Pipelines	X	X				
	Bayou des Allemands					X	
	Davis Pond Deversion Structure						X
	Hwy 90 (Future I-49)			X	X		
	LA 20			X			
	LA 307			X			
	LA 3127			X	X		

Table 3.6. Planning Unit 2 Existing Conditions/ Problem Identification

NOTE: Rankings are only relatable within an ecosystem unit; the purpose is not to prioritize between units, but rather to prioritize function disruptions within ecosystem units

Function Disruption (System Threat)	Ecosystem Unit					
	EU 2-1	EU 2-2	EU 2-3	EU 2-4	EU 2-5	EU 2-6
	Upper Basin Swamps	Middle Basin FW Marsh	Middle Basin Intermediate Marsh	Fringing Marsh	Shoreline/ Barrier Islands	Delta
Subsidence	M	M	H	H	H	VH
Tidal Exchange	NI	L	M	H	H	L
Sediment Disruptions	VH	M	H	VH	H	NI
Salt Water Intrusion	NI	L	H	H	NI	NI
Altered Inundation	M	L	L	H	NI	NI
Wave/Wake Energy	L	M	M	VH	VH	H
Direct Removal	L	L	M	H	M	M

No Impact

NI

Low

L

Moderate

M

High

H

Very High

VH

Subsidence = true subsidence; benchmark elevations not referenced to tide gauges

Tidal Exchange = Daily tide energy; assumed to be more destructive to historically fresh/intermediate wetlands, more beneficial to brackish/saline wetlands

Sediment Disruptions = disconnection from riverine sources

Saltwater Intrusion = due to encroachment of Gulf on landscape edge or movement up canals & channels

Altered Inundation = altered frequency or duration of inundation, not related to RSLR; e.g., impoundments

Wave/Wake Energy = includes storm energy

Direct Removal = dredging sediments or covering by spoil banks & levees.

Table 3.7. Planning Unit 2 Changes in Natural Resources, 1990 - 2050 (From Coast 2050 Report; LCA Land Change Map)

Resource	Ecosystem Unit					
	EU 2-1 Upper Basin Swamps	EU 2-2 Middle Basin FW Marsh	EU 2-3 Middle Basin Intermediate Marsh	EU 2-4 Fringing Marsh	EU 2-5 Shoreline/ Barrier Islands	EU 2-6 Delta
Swamp	H	M	NA	NA	NA	NA
Fresh/Intermediate Marsh	M	L	L	L	NA	I
Brackish/Saline Marsh	NA	NA	L	M	H	NA
Beach/Dune/Back Barrier Marsh	NA	NA	NA	NA	H	NA
Sessile Estuarine (Oysters)	NI	NI	NI	S	D	S
Saltwater (Red Drum)	NI	D	S	D	D	S
Freshwater (Largemouth Bass)	S	S	S	D	NI	I
Estuarine (Spotted Seatrout)	NI	D	D	D	D	S
Estuarine (Shrimp)	NI	D	D	D	D	S
Woodland Edge (Deer)	S	S	S	D	NI	S
Woodland Avifauna	D	S	S	S	D	NI
Fresh Wetlands (Alligator)	I	I	I	D	D	S
Muskrat	S	S	S	D	D	S
Shore Birds	NI	S	S	D	D	S
Loss of Storm Attenuation***	H	NI	NI	M	H	M

Wetland Key

No Impact	NI
Low Loss	L
Moderate Loss	M
High Loss	H
Increase	I
Not Applicable	NA

% Change

0
1-15
16-49
>50

Fish & Wildlife Key

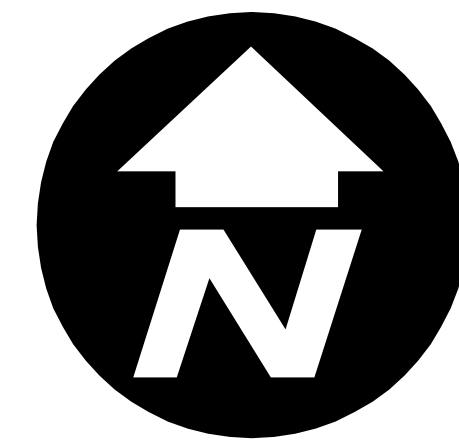
No Impact/Not historically present	NI
Steady	S
Decrease	D
Increase	I
Unknown (No information)	U

NOTES:

* = Small acreage by percentage w/in ecosys unit

** = Lake Pontchartrain Atlas

*** = Using land change as the surrogate for changes in storm attenuation capacity





5 2.5 0 5 10
Miles

1:316,800

1 inch equals 5 miles

Legend

Eco System Units

-  EU 2-1, Upper Basin Swamps
-  EU 2-2, Middle Basin Fresh Water Marsh
-  EU 2-3, Middle Basin Intermediate Marsh
-  EU 2-4, Fringing Marsh
-  EU 2-5, Shoreline/Barrier Islands
-  EU 2-6, Delta

-  Fresh Marsh
-  Intermediate Marsh
-  Brackish Marsh
-  Saline Marsh
-  Non-wetland
-  Swamp
-  Wetland Forest
-  Wetland Shrub/Scrub
-  Upland Shrub/Scrub
-  Ag/Pasture
-  Developed
-  Barren
-  Water



Map Document: (K:\DNR\GIS_Documents\Project_Maps\MXD\Area 2\Final\dnr_area_2_Natural_Resources_Final.mxd)
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LOUISIANA COMPREHENSIVE COASTAL
PROTECTION MASTER PLAN

FIGURE 3.3

PLANNING UNIT 2
ECOSYSTEM UNITS AND NATURAL RESOURCES

Table 3.8a Planning Unit 2: Objectives and Measures Table - Concentrated Assets

	Geographic Location	Current Issues*	Future Risk/Impact	Planning Unit Objective	Coastal Objectives	Measures																													
						1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
						West Bank and Vicinity, New Orleans, Louisiana Hurricane Mitigation Project	USACE Barrier Plan: GWW Alignment from below Belle Chasse and connect to existing Larose to Golden Meadow levee.	New Orleans to Venice (Plaquemines West Bank levee from St. Jude (City Price) to Venice - 34 miles)	Oakville to LaReussitte, Louisiana (CAP Sec 25)	Grand Isle and Vicinity, Louisiana Project (Flood Control)	Larose to Golden Meadow, LA Hurricane Protection Project	Donaldsonville to the Gulf: Highway 90 Levee Alignment (includes Lafourche to Golden Meadow)	Donaldsonville to the Gulf: Modified GWW Alignment (including Lafitte / Barataria)	Donaldsonville to the Gulf: Bayou Lafourche Levee Alignment	Donaldsonville to the Gulf: Pipeline Canal Levee Alignment	Lafitte / Barataria Levee Protection (Fisher School, Rosethorne, Goose Bayou and Pallet basins - CAP Sec 25)	Crown Point Levee Protection (Crown Point Basin - CAP Sec 25)	Southeast Louisiana Urban Flood Control Project - Jefferson Parish	Watershed Management Plan (integrated hydrologic restoration, marsh management, flood control, etc.)	LCA: Small Bayou Lafourche reintroduction (≤ 5,000 CFS)	Small Diversion at Donaldsonville (1,000 CFS) / Manage Effluent - Bayou Lafourche (Lafourche)	Small Diversion at Donaldsonville w/ Sediment Enrichment (≤ 5,000 CFS)	Small Diversion at Pikes Peak (1,000 CFS)	Small Diversion at Pikes Peak w/ Sediment Enrichment	Small Diversion at Edgard (1,000 CFS)	Small Diversion at Edgard w/ Sediment Enrichment (≤ 5,000 CFS)	Small Diversion at Lac des Allemands (1,000 CFS)	Small Diversion at Lac des Allemands w/ Sediment Enrichment (≤ 5,000 CFS)	LCA: Reauthorization of Davis Pond - Optimize for Marsh Creation	Small Diversion at Oakville (≤ 5,000 CFS)	Small Diversion at Myrtle Grove (≤ 5,000 CFS)	LCA: Medium Diversion at Myrtle Grove w/ Sediment Enrichment (5,001 to 15, 000 CFS)	Medium Diversion at Myrtle Grove (5,001 to 15,000 CFS)	Small Diversion at Port Sulphur (≤ 5, 000 CFS)	Small Diversion at Empire (≤ 5, CFS)
						Alt. 2**	Alt. 1	Alt. 1 Alt. 2	Alt. 2	Alt. 1 Alt. 2	Alt. 1	Alt. 2	Alt. 1			Alt. 2	Alt. 2		Alt. 1 Alt. 2	Alt. 1 Alt. 2			Alt. 1 Alt. 2			Alt. 1 Alt. 2			Alt. 1 Alt. 2				Alt. 1 Alt. 2		
Concentrated Assets	Metro Area on West Bank	Extremely high flood risk to Concentrated Assets with storm surges over 2 ft.	Increased flood risk to assets due to sea level rise, subsidence, and wetland loss.	Provide coastal protection to Metro Area on West Bank Concentrated Assets.	A, B	+	+				+	+	+	+		+	+									+			+	+					
	Upper Plaquemines Parish	Extremely high level of flood risk to Concentrated Assets with storm surges over 2 ft.	Increased flood risk to assets due to sea level rise, subsidence, and wetland loss.	Provide coastal protection to Upper Plaquemines Parish Concentrated Assets.	A, B,C, D	+	+		+																		+	+	+	+	+				
	Lower Plaquemines Parish	Extremely high flood risk to Concentrated Assets with storm surges over 2 ft.	Increased flood risk to assets due to sea level rise, subsidence, and wetland loss.	Provide coastal protection to Lower Plaquemines Parish Concentrated Assets.	A, B,C, D			+																			+		+	+		+			
	Oil & Gas, Fishing and Tourism Communities	Extremely high level of flood risk to Concentrated Assets with storm surges over 15 ft.	Increased flood risk to assets due to sea level rise, subsidence, and wetland loss.	Provide coastal protection to the Oil & Gas, Fishing and Tourism Communities including Grand Isle, Lafitte, Golden Meadow's	A, B,C, D						+			+	+		+									+			+	+					
	Industrial Communities	Extremely high level of flood risk to Concentrated Assets with storm surges over 2 ft.	Increased flood risk to assets due to sea level rise, subsidence, and wetland loss.	Provide coastal protection to Industrial Communities around Port Fourchon Concentrated Assets.	A, D																														
	South Lafourche	Extremely high flood risk to Concentrated Assets with storm surges over 2 ft.	Significantly increased flood risk due to wetland loss exposing defense structures to open Gulf conditions.	Provide coastal protection to South Lafourche Concentrated Assets.	A, B,C, D		+				+	+	+	+	+		+																		
	Central Lafourche	Extremely high flood risk to Concentrated Assets with storm surges over 2 ft.	Increased flood risk to assets due to sea level rise, subsidence, and wetland loss.	Provide coastal protection to Central Lafourche Concentrated Assets.	A, B,C, D		+				+	+	+	+	+		+																		
	North Lafourche, Assumption, and Ascension	Extremely high flood risk to Concentrated Assets with storm surges over 25 ft.	Increased flood risk to assets due to sea level rise, subsidence, and wetland loss.	Provide coastal protection to North Lafourche, Assumption, and Ascension Concentrated Assets.	A, B,C, D		+					+	+	+	+		+	+	+	+	+	+	+	+	+	+									
	River Parish Communities	Extremely high flood risk to Concentrated Assets with storm surges over 25 ft.	Increased flood risk to assets due to sea level rise, subsidence, and wetland loss.	Provide coastal protection to River Parish Communities Concentrated Assets.	A, B,C, D		+					+	+	+	+			+		+	+	+	+	+	+				+						
Central Basin Communities	Extremely high flood risk to Concentrated Assets with storm surges over 2 ft.	Increased flood risk to assets due to sea level rise, subsidence, and wetland loss.	Provide coastal protection to Central Basin Communities Concentrated Assets.	A, B,C, D		+					+	+	+	+			+		+	+	+	+	+	+				+							

* Current issues, percent flooded: H = High (25-50%); EH= Extremely High (> 50%)
** Alternative Plan (Measure used in Alternative Plans)

Coastwide Objectives:
A - Reduce storm damage vulnerability of coastal communities, resources, and infrastructure.
B - Minimize exposure of traditional flood protection measures to open Gulf conditions.
C - Increase sediment input from sources outside estuarine basins, and manage existing sediment resources within estuarine basines, to sustain and rejuvenate existing wetlands, rebuild marsh substrate and construct flood protections projects.
D - Maintain or establish natural landscape features and hydrologic processes that are critical to sustainable ecosystems structure and function, including dissipation of storm energy.
E - Establish or maintain dynamic salinity gradients that reflect natural cycles of freshwater availability and marine forcing (fluctuation related to normal daily and seasonal tide action or exchange).
F - Sustain productive and diverse wildlife habitats.
G - Maximize retention of river-borne sediments and nutrients within coastal wetlands.

Concentrated Asset Table Legend			
Page 1	Page 2	Page 3	Page 4

(Continued on Sheet 2)

Table 3.8a Planning Unit 2: Objectives and Measures Table - Concentrated Assets

	Geographic Location	Current Issues*	Future Risk/Impact	Planning Unit Objective	Coastal Objectives	Measures																																	
						31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60				
						≤ 5,000 CFS	≤ 5,000 CFS	≤ 5,000 CFS	≤ 5,000 CFS	≤ 5,000 CFS	≤ 5,000 CFS	≤ 5,000 CFS	≤ 5,000 CFS	≤ 5,000 CFS	≤ 5,000 CFS	≤ 5,000 CFS	≤ 5,000 CFS	≤ 5,000 CFS	≤ 5,000 CFS	≤ 5,000 CFS	≤ 5,000 CFS	≤ 5,000 CFS	≤ 5,000 CFS	≤ 5,000 CFS	≤ 5,000 CFS	≤ 5,000 CFS	≤ 5,000 CFS	≤ 5,000 CFS	≤ 5,000 CFS	≤ 5,000 CFS	≤ 5,000 CFS	≤ 5,000 CFS	≤ 5,000 CFS	≤ 5,000 CFS	≤ 5,000 CFS	≤ 5,000 CFS			
						Medium Diversion at Empire (≤ 5,000 CFS)	Small Diversion at Bastian Bay/Buras (≤ 5,000 CFS)	Large Diversion Bastian Bay/Buras (> 15,000 CFS)	Small Diversion at Fort Jackson (≤ 5,000 CFS)	Large Diversion at Fort Jackson (> 15, CFS)	Large Diversion at Fort Jackson w/ Sediment Enrichment (> 15, CFS)	Large Diversion at Boothville w/ Sediment Enrichment (> 15, CFS)	Sediment Delivery via Pipeline at Myrtle Grove	Sediment Delivery via Pipeline at Empire	Sediment Delivery via Pipeline at Basin Bay / Buras	Sediment Delivery via Pipeline at Main Pass (Head of Passes)	Relocation of Deep Draft Navigation Channel	LCA: Barataria Basin Barrier Shoreline Restoration (Caminada Headland and Shell Island)	LCA: Mississippi River Delta Management Study	LCA: Mississippi River Hydrodynamic Study	LCA: Third Delta Study - Mississippi River Reintroduction near Bayou Lafourche	Barrier Shoreline Restoration Projects - restoring the Barataria barrier islands.	Marsh Creation at Wetland Creation and Restoration Feasibility Study Sites	Bayou Perot/Bayou Rigollettes Peninsula Restoration	LA Highway 1 Marsh Creation (BA-29 deauthorized) Initiate the LA-1 Marsh Creation Project (Lafourche)	EastWest Grand Terre Islands Restoration (BA-3)	Delta Building Diversion at Myrtle Grove (BA-33)	Mississippi River Reintroduction into Northwest Barataria Basin (BA-34)	Pass Chaland to Grand Bayou Pass Barier Shoreline Restoration (BA-35)	Dedicated Dredging on the Barataria Basin Landbridge (BA-36)	Little Lake Shoreline Protection /Dedicated Dredging near Round Lake (BA-37)	Barataria Barrier Island Complex Project: Pelican Island and Pass La Mer to Chaland Pass Restoration (BA-38)	Mississippi River Sediment Delivery System - Bayou Duport (BA-39)	Riverine Sand Mining/Scotfield Island Restoration (BA-4)	Restore Riverine Sand Mining / Scotfield Island (Plaquemine)	South Shore of the Pen Shoreline Protection and Marsh Creation (BA-41)			
													Alt. 1** Alt. 2**	Alt. 1 Alt. 2	Alt. 1 Alt. 2	Alt. 1 Alt. 2	Alt. 1 Alt. 2			Alt. 1 Alt. 2																			
Concentrated Assets	Metro Area on West Bank	Extremely high flood risk to Concentrated Assets with storm surges over 2 ft.	Increased flood risk to assets due to sea level rise, subsidence, and wetland loss.	Provide coastal protection to Metro Area on West Bank Concentrated Assets.	A, B	+		+		+	+	+	+	+	+	+	+	+	+	+		+		+	+			+	+	+	+	+	+	+					
	Upper Plaquemines Parish	Extremely high level of flood risk to Concentrated Assets with storm surges over 2 ft.	Increased flood risk to assets due to sea level rise, subsidence, and wetland loss.	Provide coastal protection to Upper Plaquemines Parish Concentrated Assets.	A, B,C, D	+		+		+	+	+	+	+	+	+	+	+	+	+	+		+		+				+	+	+	+	+						
	Lower Plaquemines Parish	Extremely high flood risk to Concentrated Assets with storm surges over 2 ft.	Increased flood risk to assets due to sea level rise, subsidence, and wetland loss.	Provide coastal protection to Lower Plaquemines Parish Concentrated Assets.	A, B,C, D	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+				+					+		+	+	+					
	Oil & Gas, Fishing and Tourism Communities	Extremely high level of flood risk to Concentrated Assets with storm surges over 15 ft.	Increased flood risk to assets due to sea level rise, subsidence, and wetland loss.	Provide coastal protection to the Oil & Gas, Fishing and Tourism Communities including Grand Isle, Lafitte, Golden Meadow's	A, B,C, D					+	+	+	+	+	+	+	+	+	+	+	+	+	+				+	+				+	+	+	+				
	Industrial Communities	Extremely high level of flood risk to Concentrated Assets with storm surges over 2 ft.	Increased flood risk to assets due to sea level rise, subsidence, and wetland loss.	Provide coastal protection to Industrial Communities around Port Fourchon Concentrated Assets.	A, D							+	+	+	+	+	+	+	+	+	+					+	+												
	South Lafourche	Extremely high flood risk to Concentrated Assets with storm surges over 2 ft.	Significantly increased flood risk due to wetland loss exposing defense structures to open Gulf conditions.	Provide coastal protection to South Lafourche Concentrated Assets.	A, B,C, D							+	+	+	+	+	+	+	+	+	+		+			+	+		+										
	Central Lafourche	Extremely high flood risk to Concentrated Assets with storm surges over 2 ft.	Increased flood risk to assets due to sea level rise, subsidence, and wetland loss.	Provide coastal protection to Central Lafourche Concentrated Assets.	A, B,C, D						+	+	+	+	+	+	+	+	+	+	+						+	+	+										
	North Lafourche, Assumption, and Ascension	Extremely high flood risk to Concentrated Assets with storm surges over 25 ft.	Increased flood risk to assets due to sea level rise, subsidence, and wetland loss.	Provide coastal protection to North Lafourche, Assumption, and Ascension Concentrated Assets.	A, B,C, D						+	+	+	+	+	+	+	+	+	+	+	+	+	+	+		+	+	+				+	+					
	River Parish Communities	Extremely high flood risk to Concentrated Assets with storm surges over 25 ft.	Increased flood risk to assets due to sea level rise, subsidence, and wetland loss.	Provide coastal protection to River Parish Communities Concentrated Assets.	A, B,C, D						+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+							+	+				
	Central Basin Communities	Extremely high flood risk to Concentrated Assets with storm surges over 2 ft.	Increased flood risk to assets due to sea level rise, subsidence, and wetland loss.	Provide coastal protection to Central Basin Communities Concentrated Assets.	A, B,C, D						+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+						+	+				

* Current issues, percent flooded: H = High (25-50%); EH= Extremely High (> 50%)

**** Alternative Plan (Measure used in Alternative Plans)**

Coastwide Objectives:

A - Reduce storm damage vulnerability of coastal communities, resources, and infrastructure.

B - Minimize exposure of traditional flood protection measures to open Gulf conditions.

C - Increase sediment input from sources outside estuarine basins, and manage existing sediment resources within estuarine basins, to sustain and rejuvenate existing wetlands, rebuild marsh substrate and construct flood protections projects.

D - Maintain or establish natural landscape features and hydrologic processes that are critical to sustainable ecosystems structure and function, including dissipation of storm energy.

E - Establish or maintain dynamic salinity gradients that reflect natural cycles of freshwater availability and marine forcing (fluctuation related to normal daily and seasonal tide action or exchange).

F - Sustain productive and diverse wildlife habitats.

G - Maximize retention of river-borne sediments and nutrients within coastal wetlands.

Concentrated Asset Table Legend			
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Table 3.8a Planning Unit 2: Objectives and Measures Table - Concentrated Assets

[illegible]

* Current issues, percent flooded: H = High (25-50%); EH= Extremely High (> 50%)

**** Alternative Plan (Measure used in Alternative Plans)**

Coastwide Objectives:

A - Reduce storm damage vulnerability of coastal communities, resources, and infrastructure.

B - Minimize exposure of traditional flood protection measures to open Gulf conditions.

C - Increase sediment input from sources outside estuarine basins, and manage existing sediment resources within estuarine basins, to sustain and rejuvenate existing wetlands, rebuild marsh substrate and construct flood protections projects.

D - Maintain or establish natural landscape features and hydrologic processes that are critical to sustainable ecosystems structure and function, including dissipation of storm energy.

E - Establish or maintain dynamic salinity gradients that reflect natural cycles of freshwater availability and marine forcing (fluctuation related to normal daily and seasonal tide action or exchange).

F - Sustain productive and diverse wildlife habitats.

G - Maximize retention of river-borne sediments and nutrients within coastal wetlands.

Concentrated Asset Table Legend			
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Table 3.8a Planning Unit 2: Objectives and Measures Table - Concentrated Assets

	Geographic Location	Current Issues*	Future Risk/Impact	Planning Unit Objective	Coastal Objectives	Measures																													
						91	92	93	94	95	96	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111	112	113							
						Naomi Siphon Sediment Enrichment (NA-1)	Rosethorne Wetlands Sewage Effluent Diversion (NA-6)	Bayou Segnette Wetlands Sewage Effluent Diversion (CS-3)	Grand Isle Plan, Part 1-NW GI Breakwater Enhancement	LaBranche Wetlands Drainage Diversion (JE-1)	Caminada Chenier Restoration (FN-1)	Ehmer's Island & West Grand Terre Oak Ridge Restoration (BI-4)	Grand Pierre Island Restoration (PPL 3 XBA-1c) (BS-1)	Dupre Cut Project (BA-26 was shoreline only) Wetland Restoration (MG-3)	Grand Isle - Maintain Beaches and Dunes	Ridge Restoration	Caminada Bay Fringe Marsh Creation	Little Lake Fringe Marsh Creation	Lake Heritage Basin Marsh Creation	Extra Small Diversion at Homeplace	West Point a la Hache Siphon (increase flow)	Lake Grand Ecaille to Bastian Bay Fringe Marsh Creation	Barataria Landbridge Shoreline Protection and Marsh Creation	Naomi Siphon (increase flow)	Appropriately Sized Diversions in the Upper Basin	Adaptive management through maintenance of West Bay crevasse.	Strategize and implement plan to elevate and/or relocate assets located outside the hurricane protection plans.	Lake Salvador Shoreline Protection							
																Alt. 2**										Alt. 1 Alt. 2	Alt. 1 Alt. 2	Alt. 2							
Concentrated Assets	Metro Area on West Bank	Extremely high flood risk to Concentrated Assets with storm surges over 2 ft.	Increased flood risk to assets due to sea level rise, subsidence, and wetland loss.	Provide coastal protection to Metro Area on West Bank Concentrated Assets.	A, B	+		+		+	+			+	+	+					+	+		+											
	Upper Plaquemines Parish	Extremely high level of flood risk to Concentrated Assets with storm surges over 2 ft.	Increased flood risk to assets due to sea level rise, subsidence, and wetland loss.	Provide coastal protection to Upper Plaquemines Parish Concentrated Assets.	A, B, C, D	+					+			+	+		+	+		+	+		+												
	Lower Plaquemines Parish	Extremely high flood risk to Concentrated Assets with storm surges over 2 ft.	Increased flood risk to assets due to sea level rise, subsidence, and wetland loss.	Provide coastal protection to Lower Plaquemines Parish Concentrated Assets.	A, B, C, D	+					+				+	+		+	+			+	+												
	Oil & Gas, Fishing and Tourism Communities	Extremely high level of flood risk to Concentrated Assets with storm surges over 15 ft.	Increased flood risk to assets due to sea level rise, subsidence, and wetland loss.	Provide coastal protection to the Oil & Gas, Fishing and Tourism Communities including Grand Isle, Lafitte, Golden Meadow's	A, B, C, D	+	+		+		+	+	+	+	+	+	+	+	+	+		+		+											
	Industrial Communities	Extremely high level of flood risk to Concentrated Assets with storm surges over 2 ft.	Increased flood risk to assets due to sea level rise, subsidence, and wetland loss.	Provide coastal protection to Industrial Communities around Port Fourchon Concentrated Assets.	A, D						+	+	+		+	+	+					+													
	South Lafourche	Extremely high flood risk to Concentrated Assets with storm surges over 2 ft.	Significantly increased flood risk due to wetland loss exposing defense structures to open Gulf conditions.	Provide coastal protection to South Lafourche Concentrated Assets.	A, B, C, D						+				+	+	+				+		+												
	Central Lafourche	Extremely high flood risk to Concentrated Assets with storm surges over 2 ft.	Increased flood risk to assets due to sea level rise, subsidence, and wetland loss.	Provide coastal protection to Central Lafourche Concentrated Assets.	A, B, C, D						+				+	+				+		+			+										
	North Lafourche, Assumption, and Ascension	Extremely high flood risk to Concentrated Assets with storm surges over 25 ft.	Increased flood risk to assets due to sea level rise, subsidence, and wetland loss.	Provide coastal protection to North Lafourche, Assumption, and Ascension Concentrated Assets.	A, B, C, D						+				+	+				+		+													
	River Parish Communities	Extremely high flood risk to Concentrated Assets with storm surges over 25 ft.	Increased flood risk to assets due to sea level rise, subsidence, and wetland loss.	Provide coastal protection to River Parish Communities Concentrated Assets.	A, B, C, D						+				+	+				+		+													
	Central Basin Communities	Extremely high flood risk to Concentrated Assets with storm surges over 2 ft.	Increased flood risk to assets due to sea level rise, subsidence, and wetland loss.	Provide coastal protection to Central Basin Communities Concentrated Assets.	A, B, C, D						+				+	+				+		+			+										

* Current issues, percent flooded: H = High (25-50%); EH= Extremely High (> 50%)
** Alternative Plan (Measure used in Alternative Plans)

Coastwide Objectives:
A - Reduce storm damage vulnerability of coastal communities, resources, and infrastructure.
B - Minimize exposure of traditional flood protection measures to open Gulf conditions.
C - Increase sediment input from sources outside estuarine basins, and manage existing sediment resources within estuarine basines, to sustain and rejuvenate existing wetlands, rebuild marsh substrate and construct flood protections projects.
D - Maintain or establish natural landscape features and hydrologic processes that are critical to sustainable ecosystems structure and function, including dissipation of storm energy.
E - Establish or maintain dynamic salinity gradients that reflect natural cycles of freshwater availability and marine forcing (fluctuation related to normal daily and seasonal tide action or exchange).
F - Sustain productive and diverse wildlife habitats.
G - Maximize retention of river-borne sediments and nutrients within coastal wetlands.

Concentrated Asset Table Legend			
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Table 3.8b Planning Unit 2: Objectives and Measures Table - Distributed Assets

	Geographic Location	Current Issues*	Future Risk/Impact	Planning Unit Objective	Coastal Objectives	Measures																													
						1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
						West Bank and Vicinity, New Orleans, Louisiana Hurric	USACE Barrier Plan: GIWW Alignment from below Belle Chasse and connect to existing Larose to Golden Meadow levee.	New Orleans to Venice (Plaquemines West Bank levee from St. Jude (City Price) to Venice - 34 miles)	Oakville to LaReussitte, Louisiana (CAP Sec 25)	Grand Isle and Vicinity, Louisiana Project (Flood Control)	Larose to Golden Meadow, LA Hurricane Protection Project	Donaldsonville to the Gulf: Highway 90 Levee Alignment (includes Lafourche to Golden Meadow)	Donaldsonville to the Gulf: Modified GIWW Alignment (including Lafitte / Barataria)	Donaldsonville to the Gulf: Bayou Lafourche Levee Alignment	Donaldsonville to the Gulf: Pipeline Canal Levee Alignment	Lafitte / Barataria Levee Protection (Fisher School, Rosethorne, Goose Bayou and Pallet basins - CAP Sec 25)	Crown Point Levee Protection (Crown Point Basin - CAP Sec 25)	Southeast Louisiana Urban Flood Control Project - Jefferson Parish	Watershed Management Plan (Integrated hydrologic restoration, marsh mangement, flood control, etc.)	LCA: Small Bayou Lafourche reintroduction (≤ 5,000 CFS)	Small Diversion at Donaldsonville (1,000 CFS) / Manage Effluent - Bayou Lafourche (Lafourche)	Small Diversion at Donaldsonville w/ Sediment Enrichment (≤ 5,000 CFS)	Small Diversion at Pikes Peak (1,000 CFS)	Small Diversion at Pikes Peak w/ Sediment Enrichment	Small Diversion at Edgard (1,000 CFS)	Small Diversion at Edgard w/ Sediment Enrichment (≤ 5,000 CFS)	Small Diversion at Lac des Allemands (1,000 CFS)	Small Diversion at Lac des Allemands w/ Sediment Enrichment (≤ 5,000 CFS)	LCA: Reauthorization of Davis Pond - Optimize for Marsh Creation	Small Diversion at Oakville (≤ 5,000 CFS)	Small Diversion at Myrtle Grove (≤ 5,000 CFS)	LCA: Medium Diversion at Myrtle Grove w/ Sediment Enrichment (5,001 to 15, 000 CFS)	Medium Diversion at Myrtle Grove (5,001 to 15,000 CFS)	Small Diversion at Port Sulphur (≤ 5, 000 CFS)	Small Diversion at Empire (≤ 5, CFS)
Alt. 2**	Alt. 1	Alt. 1 Alt. 2	Alt. 2	Alt. 1 Alt. 2	Alt. 1	Alt. 2	Alt. 1			Alt. 2	Alt. 2		Alt. 1 Alt. 2	Alt. 1 Alt. 2			Alt. 1 Alt. 2			Alt. 1 Alt. 2		Alt. 1 Alt. 2			Alt. 1 Alt. 2			Alt. 1 Alt. 2							
Distributed Assets	DA2-1 Birdsfoot Delta	High level of flood risk to Distributed Assets with storm surges over 25 ft.	Increased flood risk to assets due to sea level rise, subsidence, and wetland loss.	Provide coastal protection to the Southwest Pass.	A, C, D, G																														
				Provide coastal protection to oil and gas fields and pipelines.	A, C, D, G																														
	DA2-2 Empire	Extremely high level of flood risk to Distributed Assets with storm surges over 2 ft.	Increased flood risk to assets due to sea level rise, subsidence, and wetland loss.	Provide coastal protection to lower coast port facilities.	A, B, C, D, G																												+		
				Provide coastal protection to oil and gas fields and pipelines.	A, C, D, G																													+	
	DA2-3 Grand Cheniere	High level of flood risk to Distributed Assets with storm surges over 25 ft.	Loss of Distributed Assets due to permanent erosion/flooding.	Provide coastal protection to back levees.	A, B,																											+			
				Provide coastal protection to oil and gas fields and pipelines.	A, C, D, G																											+			
	DA2-4 Bay	Extremely high level of flood risk to Distributed Assets with storm surges over 25 ft.	Loss of Distributed Assets due to permanent erosion/flooding.	Provide coastal protection to oil and gas fields and pipelines.	A, C, D, G																														
				Provide coastal protection to the LOOP distribution system.	A, B, C, D, G																														
				Provide coastal protection to the Barataria Bay Waterway.	A, C, D, G																														
				Provide coastal protection to LA1.	A, C, D																														
				Provide coastal protection to the Waterline from Lafitte to Grand Isle.	A, C, D																														
	DA2-5 L'ours	High level of flood risk to Distributed Assets with storm surges over 25 ft.	Increased flood risk to assets due to sea level rise, subsidence, and wetland loss.	Provide coastal protection to the LOOP distribution system.	A, B, C, D, G																														
				Provide coastal protection to oil and gas fields and pipelines.	A, C, D, G																														
				Provide coastal protection to LA-1.	A, C, D																														
	DA2-6 North Bay	High level of flood risk to Distributed Assets with storm surges over 25 ft.	Increased flood risk to assets due to sea level rise, subsidence, and wetland loss.	Provide coastal protection to oil and gas fields and pipelines.	A, C, D, G																								+	+	+	+			
				Provide coastal protection to Barataria Bay Waterway.	A, C, D, G																								+	+	+	+			
	DA2-7 Central Marsh	High level of flood risk to Distributed Assets with storm surges over 25 ft.	Loss of Distributed Assets due to permanent erosion/flooding.	Provide coastal protection to oil and gas fields and pipelines	A, C, D, G								+														+		+	+	+				
				Provide coastal protection to Barataria Bay Waterway.	A, C, D, G										+												+		+	+	+				
				Provide coastal protection to the GIWW.	A, C, D, G										+												+								

(Continued on Page 9)

* Current issues, percent flooded: H = High (25-50%); EH= Extremely High (> 50%)
** Alternative Plan (Measure used in Alternative Plans)

Coastwide Objectives:
A - Reduce storm damage vulnerability of coastal communities, resources, and infrastructure.
B - Minimize exposure of traditional flood protection measures to open Gulf conditions.
C - Increase sediment input from sources outside estuarine basins, and manage existing sediment resources within estuarine basins, to sustain and rejuvenate existing wetlands, rebuild marsh substrate and construct flood protections projects.
D - Maintain or establish natural landscape features and hydrologic processes that are critical to sustainable ecosystems structure and function, including dissipation of storm energy.
E - Establish or maintain dynamic salinity gradients that reflect natural cycles of freshwater availability and marine forcing (fluctuation related to normal daily and seasonal tide action or exchange).
F - Sustain productive and diverse wildlife habitats.
G - Maximize retention of river-borne sediments and nutrients within coastal wetlands.

Distributed Asset Table Legend			
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(Continued on Page 6)

Table 3.8b Planning Unit 2: Objectives and Measures Table - Distributed Assets

	Geographic Location	Current Issues*	Future Risk/Impact	Planning Unit Objective	Coastal Objectives	Measures																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
						31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
						Medium Diversion at Empire : (≤ 5,001 to 15,000 CFS)	Small Diversion at Bastian Bay/Buras (≤ 5, 000 CFS)	Large Diversion Bastian Bay/Buras (> 15, 000 CFS)	Small Diversion at Fort Jackson : (≤ 5,000 CFS)	Large Diversion at Fort Jackson (> 15, CFS)	Large Diversion at Fort Jackson w/ Sediment Enrichment (> 15, CFS)	Large Diversion at Boothville w/ Sediment Enrichment (> 15, CFS)	Sediment Delivery via Pipeline at Myrtle Grove	Sediment Delivery via Pipeline at Empire	Sediment Delivery via Pipeline at Basin Bay / Buras	Sediment Delivery via Pipeline at Main Pass (Head of Paseses)	Relocation of Deep Draft Navigation Channel	LCA: Barataria Basin Barrier Shoreline Restoration (Caminada Headland and Shell Island)	LCA: Mississippi River Delta Management Study	LCA: Mississippi River Hydrodynamic Study	LCA: Third Delta Study - Mississippi River Reintroduction near Bayou Lafourche	Barrier Shoreline Restoration Projects - restoring the Barataria barrier islands.	Marsh Creation at Wetland Creation and Restoration Feasibility Study Sites	Bayou Perot/Bayou Rigolettes Peninsula Restoration	LA Highway 1 Marsh Creation (BA-29 deauthorized) Initiate the LA-1 Marsh Creation Project (Laburche)	East/West Grand Terre Islands Restoration (BA-3)	Delta Building Diversion at Myrtle Grove (BA-33)	Mississippi River Reintroduction into Northwest Barataria Basin (BA-34)	Pass Chalaud to Grand Bayou Pass Barrier Shoreline Restoration (BA-35)	Dedicated Dredging on the Barataria Basin Landbridge (BA-36)	Little Lake Shoreline Protection / Dedicated Dredging near Round Lake (BA-37)	Barataria Barrier Island Complex Project: Pelican Island and Pass La Mer to Chalaud Pass Restoration (BA-38)	Mississippi River Sediment Delivery System - Bayou Duport (BA-39)	Riverine Sand Mining/Scotfield Island Restoration (BA-4)	Restore Riverine Sand Mining / Scotfield Island (Plaquemine)	South Shore of the Pen Shoreline Protection and Marsh Creation (BA-41)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																		
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* Current issues, percent flooded: H = High (25-50%); EH= Extremely High (> 50%)
 ** Alternative Plan (Measure used in Alternative Plans)

Coastwide Objectives:

- A - Reduce storm damage vulnerability of coastal communities, resources, and infrastructure.
- B - Minimize exposure of traditional flood protection measures to open Gulf conditions.
- C - Increase sediment input from sources outside estuarine basins, and manage existing sediment resources within estuarine basins, to sustain and rejuvenate existing wetlands, rebuild marsh substrate and construct flood protections projects.
- D - Maintain or establish natural landscape features and hydrologic processes that are critical to sustainable ecosystems structure and function, including dissipation of storm energy.
- E - Establish or maintain dynamic salinity gradients that reflect natural cycles of freshwater availability and marine forcing (fluctuation related to normal daily and seasonal tide action or exchange).
- F - Sustain productive and diverse wildlife habitats.
- G - Maximize retention of river-borne sediments and nutrients within coastal wetlands.

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Page 9	Page 10	Page 11	Page 12

Table 3.8b Planning Unit 2: Objectives and Measures Table - Distributed Assets

	Geographic Location	Current Issues*	Future Risk/Impact	Planning Unit Objective	Coastal Objectives	Measures																													
						61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90
						Lake Hermitage Marsh Creation (BA-42)	Periodic introduction of Sediment and Nutrients at Selected Diversion Sites Demonstration (MR-11)	Mississippi River Sediment Trap(MR-12)	Spanish Pass Diversion (MR-14) - Restore S	Venice Ponds Marsh Creation and Crevassees (MR-15)	Small Freshwater Diversion at Home Place, Happy Jack, Hero Canal	Davis Pond Outfall Management	Reactivate Bayou LaFourche as Distributary Channel of Mississippi	Freshwater and Sediment Diversions	Manage Municipal Effluent to Restore and Sustain Marsh (Jefferson)	Stabilize Lafitte / Barataria Shoreline (Jefferson) Shoreline Stabilization at Grand Isle Water Tank (PR-5) (Jefferson Parish)	Implement Shoreline Protection Measures (Jefferson) Goose Bayou to Cypress Bayou Shoreline Protection (NA-3)	Implement the Ships for Shores Project (Jefferson)	Restore Jefferson Barrier Islands (Jefferson) Elmer's Island & West Grand Terre Oak Ridge Restoration (BI-4)	Beneficially Use Dredged Material	Construct a Coastal Slurry Pipeline (Plaquemines, Jefferson, Lafourche)	Enhance LA Highway 23 for Flood Protection (Plaquemines)	Manage Effluent - Bayou Lafourche (Lafourche)	Restore the Lafourche Parish Coast (Lafourche)	Bayou Dupont Sediment Delivery Expansion	Bayou Rigolettes, Bayou Perot and Harvey Cut Channel Management (PR-1)	Dupre Cut/Barataria Bay Waterway Channel Management (PR-2)	Land Bridge Shoreline Protection Ext. and Wetland Restore (PR-7)	Goose Bayou to Cypress Bayou Shoreline Protection (NA-3)	Lafitte Oil and Gas Field (East) Restoration (MG-2)	Delta Farms Oil and Gas Field Restoration (PR-5)	Grand Isle Oil and Gas Pipeline Corridor Shoreline Protection (BI-5)	Goose Bayou to Lafitte Levee (NA-8)	Elmer's Island Acquisition and Preservation (BI-3)	North Barataria Bay Shoreline Wave Breaks (BB-1)
															Alt. 1** Alt. 2**	Alt. 1 Alt. 2										Alt. 1 Alt. 2	Alt. 1 Alt. 2						Alt. 2		
Distributed Assets	DA2-1 Birdsfoot Delta	High level of flood risk to Distributed Assets with storm surges over 25 ft.	Increased flood risk to assets due to sea level rise, subsidence, and wetland loss.	Provide coastal protection to the Southwest Pass.	A, C, D, G												+																		
				Provide coastal protection to oil and gas fields and pipelines.	A, C, D, G														+																
	DA2-2 Empire	Extremely high level of flood risk to Distributed Assets with storm surges over 2 ft.	Increased flood risk to assets due to sea level rise, subsidence, and wetland loss.	Provide coastal protection to lower coast port facilities.	A, B, C, D, G					+							+	+																	
				Provide coastal protection to oil and gas fields and pipelines.	A, C, D, G					+									+	+															
	DA2-3 Grand Cheniere	High level of flood risk to Distributed Assets with storm surges over 25 ft.	Loss of Distributed Assets due to permanent erosion/flooding.	Provide coastal protection to back levees.	A, B,	+	+		+	+	+			+			+	+																	
				Provide coastal protection to oil and gas fields and pipelines.	A, C, D, G	+	+		+	+	+			+					+	+															
	DA2-4 Bay	Extremely high level of flood risk to Distributed Assets with storm surges over 25 ft.	Loss of Distributed Assets due to permanent erosion/flooding.	Provide coastal protection to oil and gas fields and pipelines.	A, C, D, G		+									+		+	+			+									+		+	+	
				Provide coastal protection to the LOOP distribution system.	A, B, C, D, G																+			+										+	
				Provide coastal protection to the Barataria Bay Waterway.	A, C, D, G												+			+	+			+										+	
				Provide coastal protection to LA1.	A, C, D															+			+										+		
				Provide coastal protection to the Waterline from Lafitte to Grand Isle.	A, C, D													+		+	+			+										+	
	DA2-5 L'ours	High level of flood risk to Distributed Assets with storm surges over 25 ft.	Increased flood risk to assets due to sea level rise, subsidence, and wetland loss.	Provide coastal protection to the LOOP distribution system.	A, B, C, D, G								+				+		+			+													
				Provide coastal protection to oil and gas fields and pipelines.	A, C, D, G										+				+		+			+											
				Provide coastal protection to LA-1.	A, C, D										+				+		+			+											
	DA2-6 North Bay	High level of flood risk to Distributed Assets with storm surges over 25 ft.	Increased flood risk to assets due to sea level rise, subsidence, and wetland loss.	Provide coastal protection to oil and gas fields and pipelines.	A, C, D, G		+						+				+	+		+	+		+				+							+	
				Provide coastal protection to Barataria Bay Waterway.	A, C, D, G		+							+			+		+	+		+	+		+			+							+
	DA2-7 Central Marsh	High level of flood risk to Distributed Assets with storm surges over 25 ft.	Loss of Distributed Assets due to permanent erosion/flooding.	Provide coastal protection to oil and gas fields and pipelines	A, C, D, G		+					+	+		+	+		+	+		+	+	+	+	+	+		+		+					
				Provide coastal protection to Barataria Bay Waterway.	A, C, D, G		+						+	+		+	+		+	+		+	+	+	+	+	+		+		+				
				Provide coastal protection to the GIWW.	A, C, D, G		+						+	+		+	+		+	+		+	+	+	+	+	+		+		+				

(Continued on Page 11)

* Current issues, percent flooded: H = High (25-50%); EH= Extremely High (> 50%)
** Alternative Plan (Measure used in Alternative Plans)

Coastwide Objectives:
A - Reduce storm damage vulnerability of coastal communities, resources, and infrastructure.
B - Minimize exposure of traditional flood protection measures to open Gulf conditions.
C - Increase sediment input from sources outside estuarine basins, and manage existing sediment resources within estuarine basins, to sustain and rejuvenate existing wetlands, rebuild marsh substrate and construct flood protections projects.
D - Maintain or establish natural landscape features and hydrologic processes that are critical to sustainable ecosystems structure and function, including dissipation of storm energy.
E - Establish or maintain dynamic salinity gradients that reflect natural cycles of freshwater availability and marine forcing (fluctuation related to normal daily and seasonal tide action or exchange).
F - Sustain productive and diverse wildlife habitats.
G - Maximize retention of river-borne sediments and nutrients within coastal wetlands.

Distributed Asset Table Legend			
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Table 3.8b Planning Unit 2: Objectives and Measures Table - Distributed Assets

	Geographic Location	Current Issues*	Future Risk/Impact	Planning Unit Objective	Coastal Objectives	Measures																															
						91	92	93	94	95	96	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111	112	113									
						Naomi Siphon Sediment Enrichment (NA-1)	Rosethorne Wetlands Sewage Effluent Division (NA-6)	Bayou Segnette Wetlands Sewage Effluent Diversion (CS-3)	Grand Isle Plan, Part 1-NW GI Breakwater Enhancement	LaBranche Wetlands Drainage Diversion (JE-1)	Caminada Chenier Restoration (FN-1)	Elmer's Island & West Grand Terre Oak Ridge Restoration (BI-4)	Grand Pierre Island Restoration (PPL 3 XBA-1c) (BS-1)	Dupre Cut Project (BA-26 was shoreline only) Wetland Restoration (MG-3)	Grand Isle - Maintain Beaches and Dunes	Ridge Restoration	Caminada Bay Fringe Marsh Creation	Little Lake Fringe Marsh Creation	Lake Hermitage Basin Marsh Creation	Extra Small Diversion at Homeplace	West Point a la Hache Siphon (increase flow)	Lake Grand Ecaille to Bastian Bay Fringe Marsh Creation	Barataria Landbridge Shoreline Protection and Marsh Creation	Naomi Siphon (increase flow)	Appropriately Sized Diversions in the Upper Basin	Adaptive management through maintenance of West Bay crevasse.	Strategize and implement plan to elevate and/or relocate assets located outside the hurricane protection plans.	Lake Salvador Shoreline Protection									
Distributed Assets	DA2-1 Birdsfoot Delta	High level of flood risk to Distributed Assets with storm surges over 25 ft.	Increased flood risk to assets due to sea level rise, subsidence, and wetland loss.	Provide coastal protection to the Southwest Pass.	A, C, D, G																																
				Provide coastal protection to oil and gas fields and pipelines.	A, C, D, G																																
	DA2-2 Empire	Extremely high level of flood risk to Distributed Assets with storm surges over 2 ft.	Increased flood risk to assets due to sea level rise, subsidence, and wetland loss.	Provide coastal protection to lower coast port facilities.	A, B, C, D, G																																
				Provide coastal protection to oil and gas fields and pipelines.	A, C, D, G																																
	DA2-3 Grand Cheniere	High level of flood risk to Distributed Assets with storm surges over 25 ft.	Loss of Distributed Assets due to permanent erosion/flooding.	Provide coastal protection to back levees.	A, B,																																
				Provide coastal protection to oil and gas fields and pipelines.	A, C, D, G																																
	DA2-4 Bay	Extremely high level of flood risk to Distributed Assets with storm surges over 25 ft.	Loss of Distributed Assets due to permanent erosion/flooding.	Provide coastal protection to oil and gas fields and pipelines.	A, C, D, G						+		+		+																						
				Provide coastal protection to the LOOP distribution system.	A, B, C, D, G							+				+												+									
				Provide coastal protection to the Barataria Bay Waterway.	A, C, D, G				+		+		+			+																					
				Provide coastal protection to LA1.	A, C, D							+				+													+								
				Provide coastal protection to the Waterline from Lafitte to Grand Isle.	A, C, D				+		+		+			+																					
	DA2-5 L'ours	High level of flood risk to Distributed Assets with storm surges over 25 ft.	Increased flood risk to assets due to sea level rise, subsidence, and wetland loss.	Provide coastal protection to the LOOP distribution system.	A, B, C, D, G											+		+																			
				Provide coastal protection to oil and gas fields and pipelines.	A, C, D, G													+		+																	
				Provide coastal protection to LA-1.	A, C, D													+																			
	DA2-6 North Bay	High level of flood risk to Distributed Assets with storm surges over 25 ft.	Increased flood risk to assets due to sea level rise, subsidence, and wetland loss.	Provide coastal protection to oil and gas fields and pipelines.	A, C, D, G												+		+																		
				Provide coastal protection to Barataria Bay Waterway.	A, C, D, G													+																			
	DA2-7 Central Marsh	High level of flood risk to Distributed Assets with storm surges over 25 ft.	Loss of Distributed Assets due to permanent erosion/flooding.	Provide coastal protection to oil and gas fields and pipelines	A, C, D, G	+	+							+		+											+										
				Provide coastal protection to Barataria Bay Waterway.	A, C, D, G		+										+																				
				Provide coastal protection to the GIWW.	A, C, D, G																																

(Continued on Page 12)

* Current issues, percent flooded: H = High (25-50%); EH= Extremely High (> 50%)
** Alternative Plan (Measure used in Alternative Plans)

Coastwide Objectives:
A - Reduce storm damage vulnerability of coastal communities, resources, and infrastructure.
B - Minimize exposure of traditional flood protection measures to open Gulf conditions.
C - Increase sediment input from sources outside estuarine basins, and manage existing sediment resources within estuarine basins, to sustain and rejuvenate existing wetlands, rebuild marsh substrate and construct flood protections projects.
D - Maintain or establish natural landscape features and hydrologic processes that are critical to sustainable ecosystems structure and function, including dissipation of storm energy.
E - Establish or maintain dynamic salinity gradients that reflect natural cycles of freshwater availability and marine forcing (fluctuation related to normal daily and seasonal tide action or exchange).
F - Sustain productive and diverse wildlife habitats.
G - Maximize retention of river-borne sediments and nutrients within coastal wetlands.

Distributed Asset Table Legend			
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Table 3.8b Planning Unit 2: Objectives and Measures Table - Distributed Assets

	Geographic Location	Current Issues*	Future Risk/Impact	Planning Unit Objective	Coastal Objectives	Measures																													
						1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
						West Bank and Vicinity, New Orleans, Louisiana Hurric	USACE Barrier Plan: GIWW Alignment from below Belle Chasse and connect to existing Larose to Golden Meadow levee.	New Orleans to Venice (Plaquemines West Bank levee from St. Jude (City Price) to Venice - 34 miles)	Oakville to LaReussitte, Louisiana (CAP Sec 25)	Grand Isle and Vicinity, Louisiana Project (Flood Control	Larose to Golden Meadow, LA Hurricane Protection Project	Donaldsonville to the Gulf: Highway 90 Levee Alignment (includes Lafourche to Golden Meadow)	Donaldsonville to the Gulf: Modified GIWW Alignment (including Lafitte / Barataria)	Donaldsonville to the Gulf: Bayou Lafourche Levee Alignment	Donaldsonville to the Gulf: Pipeline Canal Levee Alignment	Lafitte / Barataria Levee Protection (Fisher School, Rosethorne, Goose Bayou and Pallet basins - CAP Sec 25)	Crown Point Levee Protection (Crown Point Basin - CAP Sec 25)	Southeast Louisiana Urban Flood Control Project - Jefferson Parish	Watershed Management Plan (Integrated hydrologic restoration, marsh mangement, flood control, etc.)	LCA: Small Bayou Lafourche reintroduction (≤ 5,000 CFS)	Small Diversion at Donaldsonville (1,000 CFS) / Manage Effluent - Bayou Lafourche (Lafourche)	Small Diversion at Donaldsonville w/ Sediment Enrichment (≤5,000 CFS)	Small Diversion at Pikes Peak (1,000 CFS)	Small Diversion at Pikes Peak w/ Sediment Enrichment	Small Diversion at Edgard (1,000 CFS)	Small Diversion at Edgard w/ Sediment Enrichment (≤ 5,000 CFS)	Small Diversion at Lac des Allemands (1,000 CFS)	Small Diversion at Lac des Allemands w/ Sediment Enrichment (≤5,000 CFS)	LCA: Reauthorization of Davis Pond - Optimize for Marsh Crealion	Small Diversion at Oakville (≤ 5,000 CFS)	Small Diversion at Myrtle Grove (≤ 5,000 CFS)	LCA: Medium Diversion at Myrtle Grove w/ Sediment Enrichment (5,001 to 15, 000 CFS)	Medium Diversion at Myrtle Grove (5,001 to 15,000 CFS)	Small Diversion at Port Sulphur (≤5, 000 CFS)	Small Diversion at Empire (≤ 5, CFS)
Alt. 2**	Alt. 1	Alt. 1 Alt. 2	Alt. 2	Alt. 1 Alt. 2	Alt. 1	Alt. 2	Alt. 1			Alt. 2	Alt. 2		Alt. 1 Alt. 2	Alt. 1 Alt. 2			Alt. 1 Alt. 2			Alt. 1 Alt. 2		Alt. 1 Alt. 2		Alt. 1 Alt. 2			Alt. 1 Alt. 2								
Distributed Assets	DA2-8 Salvador	Extremely high level of flood risk to Distributed Assets with storm surges over 25 ft.	Loss of Distributed Assets due to permanent erosion/flooding.	Provide coastal protection to oil and gas fields and pipelines.	A, C, D, G		+						+														+								
				Provide coastal protection to the GIWW.	A, C, D, G		+						+															+							
				Provide coastal protection to Bayou des Allemands.	A, C, D, G		+						+																						
				Provide coastal protection to Hwy 90.	A, C, D, G		+						+																						
	DA2-9 Des Allemands	Extremely high level of flood risk to Distributed Assets with storm surges over 25 ft.	Loss of Distributed Assets due to permanent erosion/flooding.	Provide coastal protection to oil and gas fields and pipelines.	A, C, D, G		+					+	+					+	+	+	+	+	+	+	+	+									
				Provide coastal protection to Bayou des Allemands.	A, C, D, G		+					+	+					+	+	+	+	+	+	+	+	+	+								
				Provide coastal protection to Highways 22, 7, 37, 33, 3127 and 3199.	A, B, C, D, G		+					+	+	+			+	+	+	+	+	+	+	+	+	+									

(Continued on Page 10)

* Current issues, percent flooded: H = High (25-50%); EH= Extremely High (> 50%)

** Alternative Plan (Measure used in Alternative Plans)

Coastwide Objectives:

A - Reduce storm damage vulnerability of coastal communities, resources, and infrastructure.

B - Minimize exposure of traditional flood protection measures to open Gulf conditions.

C - Increase sediment input from sources outside estuarine basins, and manage existing sediment resources within estuarine basins, to sustain and rejuvenate existing wetlands, rebuild marsh substrate and construct flood protections projects.

D - Maintain or establish natural landscape features and hydrologic processes that are critical to sustainable ecosystems structure and function, including dissipation of storm energy.

E - Establish or maintain dynamic salinity gradients that reflect natural cycles of freshwater availability and marine forcing (fluctuation related to normal daily and seasonal tide action or exchange).

F - Sustain productive and diverse wildlife habitats.

G - Maximize retention of river-borne sediments and nutrients within coastal wetlands.

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Table 3.8c Planning Unit 2: Objectives and Measures Table - Ecosystem Units

	Geographic Location	Current Issues	Future Risk/Impact*	Planning Unit Objective	Coastal Objectives	Measures																															
						1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30		
						West Bank and Vicinity, New Orleans, Louisiana Hurricane	USACE Barrier Plan: GWW Alignment from below Belle Chasse and connect to existing Larose to Golden Meadow levee.	New Orleans to Venice (Plaquemines West Bank levee from St. Jude (City Price) to Venice - 34 miles)	Oakville to LaReussitte, Louisiana (CAP Sec 25)	Grand Isle and Vicinity, Louisiana Project (Flood Control)	Larose to Golden Meadow, LA Hurricane Protection Project	Donaldsonville to the Gulf: Highway 90 Levee Alignment (includes Lafourche to Golden Meadow)	Donaldsonville to the Gulf: Modified GWW Alignment (including Lafitte / Barataria)	Donaldsonville to the Gulf: Bayou Lafourche Levee Alignment	Donaldsonville to the Gulf: Pipeline Canal Levee Alignment	Lafitte / Barataria Levee Protection (Fisher School, Rosethorne, Goose Bayou and Pallet basins - CAP Sec 25)	Crown Point Levee Protection (Crown Point Basin - CAP Sec 25)	Southeast Louisiana Urban Flood Control Project - Jefferson Parish	Watershed Management Plan (integrated hydrologic restoration, marsh management, flood control, etc.)	LCA: Small Bayou Lafourche reintroduction (≤ 5,000 CFS)	Small Diversion at Donaldsonville (1,000 CFS) / Manage Effluent - Bayou Lafourche (Lafourche)	Small Diversion at Donaldsonville w/ Sediment Enrichment (≤ 5,000 CFS)	Small Diversion at Pikes Peak (1,000 CFS)	Small Diversion at Piles Peak w/ Sediment Enrichment	Small Diversion at Edgard (1,000 CFS)	Small Diversion at Edgard w/ Sediment Enrichment (≤ 5,000 CFS)	Small Diversion at Lac des Allemands (1,000 CFS)	Small Diversion at Lac des Allemands w/ Sediment Enrichment (≤ 5,000 CFS)	LCA: Reauthorization of Davis Pond - Optimize for Marsh Creation	Small Diversion at Oakville (≤ 5,000 CFS)	Small Diversion at Myrtle Grove (≤ 5,000 CFS)	LCA: Medium Diversion at Myrtle Grove w/ Sediment Enrichment (5,001 to 15, 000 CFS)	Medium Diversion at Myrtle Grove (5,001 to 15,000 CFS)	Small Diversion at Port Sulphur (≤ 5, 000 CFS)	Small Diversion at Empire (≤ 5, CFS)		
Alt. 2**	Alt. 1	Alt. 1 Alt. 2	Alt. 2	Alt. 1 Alt. 2	Alt. 1	Alt. 2	Alt. 1			Alt. 2	Alt. 2		Alt. 1 Alt. 2	Alt. 1 Alt. 2			Alt. 1 Alt. 2			Alt. 1 Alt. 2		Alt. 1 Alt. 2		Alt. 1 Alt. 2			Alt. 1 Alt. 2										
Ecosystem Units	EU2-1 Upper Basin Swamps	Function disruption due to subsidence, sediment disruption, and altered inundation.	High loss of swamp and freshmarsh habitat, high reduction in storm attenuation, and decrease in avifauna.	Sustain productive fish and wildlife habitats.	F		-											+	+	+	+	+	+	+	+	+	+	+	+	+	+	+					
				Increase introduction of sediment and freshwater into the Upper Basin Swamps.	C, D, E, G		-						-								+	+	+	+	+	+	+	+	+	+	+	+	+	+	+		
	EU2-2 Middle Basin Swamps	Function disruption due to subsidence, sediment disruption, and wave/wake energy.	Moderate loss of swamp and decrease in fisheries.	Reduce wave/wake energy impacts to the Middle Basin Swamps.	D		+																														
				Sustain productive fish and wildlife habitats.	F		-														+			+	+	+	+	+	+	+	+	+	+	+	+		
				Introduce sediment and freshwater into the Middle Basin Swamps.	C, D, E, G		-														+			+	+	+	+	+	+	+	+	+	+	+	+		
	EU2-3 Middle Basin Intermediate Marsh	Function disruption due to subsidence, sediment disruption, and salt water intrusion.	Decrease in fisheries.	Introduce sediments into the Middle Basin Intermediate Marsh.	C		-												+													+					
				Reduce saltwater intrusion impacts of the Middle Basin Intermediate Marsh.	D, E		-														+								+	+	+	+	+	+			
				Sustain productive fish and wildlife habitats in Middle Basin Intermediate Marsh.	F																+								+	+	+	+	+	+			
	EU2-4 Fringing Marsh	Function disruption due to subsidence, tidal exchange, sediment disruptions, salt water intrusion, altered inundation, wave/wake energy, and direct removal of sediments.	Moderate loss of brackish/saline marsh, decreased fisheries and wildlife, and moderate reduction in storm attenuation.	Introduce sediments to the Fringing Marshes.	C																										+	+	+	+			
				Reduce saltwater intrusion impacts within the Fringing Marsh.	D, E																+										+	+	+	+	+	+	+
				Reduce tidal exchange along the bay rim.	D																																
				Reduce wave/wake energy impacts to the Fringing Marshes.	D																																
				Retain sediments in the fringing marsh.	G																																
				Sustain productive fish and wildlife habitats.	F																+											+	+	+	+	+	+
	EU2-5 Shoreline/Barrier Islands	Function disruption due to subsidence, wave/wake energy, tidal exchange, and sediment disruptions.	High loss of brackish/saline marsh and beach/dune/back barrier marsh, decreased fisheries and wildlife, and high reduction in storm attenuation.	Introduce sediments to the Shoreline/Barrier Islands.	C																																
				Reduce tidal exchange along the bay rim.	D																																
				Sustain productive fish and wildlife habitats along the Shoreline/Barrier Islands.	F																																
				Reduce wave/wake energy impacts to the Shoreline/Barrier Islands.	D																																
	EU2-6 Delta	Function disruption due to subsidence, wave/wake energy, and direct removal of sediments.	Moderate reduction in storm attenuation.	Maximize sediment and freshwater into the Delta area.	C																																
				Prevent direct removal of sediment within the Delta.	G																																
				Reduce wave/wake energy impacts to the Delta.	D																																

* Ecosystems Unit Future Risk, percent changed: L= Low Loss (1-15); M = Moderate Loss (16-49); H = High Loss (< 5); Increase (I); Not Applicable (NA); Steady (S); Decrease (D); Increase (I); Unknown (U)
** Alternative Plan (Measure used in Alternative Plans)

Coastwide Objectives:
A - Reduce storm damage vulnerability of coastal communities, resources, and infrastructure.
B - Minimize exposure of traditional flood protection measures to open Gulf conditions.
C - Increase sediment input from sources outside estuarine basins, and manage existing sediment resources within estuarine basines, to sustain and rejuvenate existing wetlands, rebuild marsh substrate and construct flood protections projects.
D - Maintain or establish natural landscape features and hydrologic processes that are critical to sustainable ecosystems structure and function, including dissipation of storm energy.
E - Establish or maintain dynamic salinity gradients that reflect natural cycles of freshwater availability and marine forcing (fluctuation related to normal daily and seasonal tide action or exchange).
F - Sustain productive and diverse wildlife habitats.
G - Maximize retention of river-borne sediments and nutrients within coastal wetlands.

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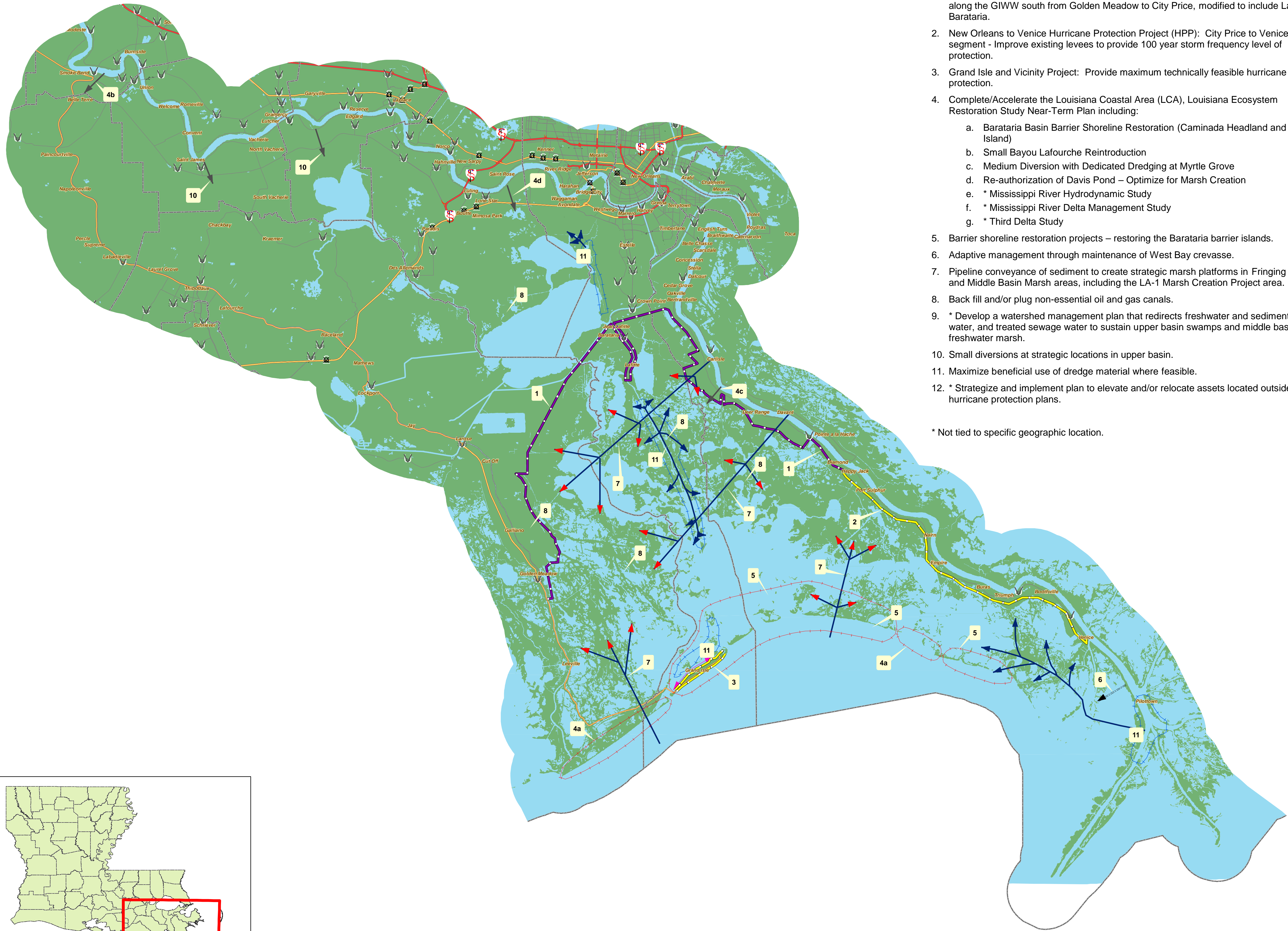
Table 3.8c Planning Unit 2: Objectives and Measures Table - Ecosystem Units

	Geographic Location	Current Issues	Future Risk/Impact*	Planning Unit Objective	Coastal Objectives	Measures																													
						91	92	93	94	95	96	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111	112	113							
						Naomi Siphon Sediment Enrichment (NA-1)	Rosethorne Wetlands Sewage Effluent Diversion (NA-6)	Bayou Segnette Wetlands Sewage Effluent Diversion (CS-3)	Grand Isle Plan, Part 1-NW GI Breakwater Enhancement	LaBranche Wetlands Drainage Diversion (JE-1)	Caminada Chenier Restoration (FN-1)	Elmer's Island & West Grand Terre Oak Ridge Restoration (BI-4)	Grand Pierre Island Restoration (PPL 3 XBA-1c) (BS-1)	Dupre Cut Project (BA-26 was shoreline only) Wetland Restoration (MG-3)	Grand Isle - Maintain Beaches and Dunes	Ridge Restoration	Caminada Bay Fringe Marsh Creation	Little Lake Fringe Marsh Creation	Lake Hermitage Basin Marsh Creation	Extra Small Diversion at Homeplace	West Point a la Hache Siphon (increase flow)	Lake Grand Ecaille to Bastian Bay Fringe Marsh Creation	Barataria Landbridge Shoreline Protection and Marsh Creation	Naomi Siphone (increase flow)	Appropriately Sized Diversions in the Upper Basin	Adaptive management through maintenance of West Bay crevasse.	Strategize and implement plan to elevate and/or relocate assets located outside the hurricane protection plans.	Lake Salvador Shoreline Protection							
																						Alt. 1 Alt. 2	Alt. 1 Alt. 2	Alt. 2											
Ecosystem Units	EU2-1 Upper Basin Swamps	Function disruption due to subsidence, sediment disruption, and altered inundation.	High loss of swamp and freshmarsh habitat, high reduction in storm attenuation, and decrease in avifauna.	Sustain productive fish and wildlife habitats.	F					+																									
				Increase introduction of sediment and freshwater into the Upper Basin Swamps.	C, D, E, G																														
	EU2-2 Middle Basin Swamps	Function disruption due to subsidence, sediment disruption, and wave/wake energy.	Moderate loss of swamp and decrease in fisheries.	Reduce wave/wake energy impacts to the Middle Basin Swamps.	D																														
				Sustain productive fish and wildlife habitats.	F		+	+																											
				Introduce sediment and freshwater into the Middle Basin Swamps.	C, D, E, G		+	+																											
	EU2-3 Middle Basin Intermediate Marsh	Function disruption due to subsidence, sediment disruption, and salt water intrusion.	Decrease in fisheries.	Introduce sediments into the Middle Basin Intermediate Marsh.	C	+															+	+													
				Reduce saltwater intrusion impacts of the Middle Basin Intermediate Marsh.	D, E	+																	+	+	+										
				Sustain productive fish and wildlife habitats in Middle Basin Intermediate Marsh.	F	+																	+	+	+										
	EU2-4 Fringing Marsh	Function disruption due to subsidence, tidal exchange, sediment disruptions, salt water intrusion, altered inundation, wave/wake energy, and direct removal of sediments.	Moderate loss of brackish/saline marsh, decreased fisheries and wildlife, and moderate reduction in storm attenuation.	Introduce sediments to the Fringing Marshes.	C																														
				Reduce saltwater intrusion impacts within the Fringing Marsh.	D, E																														
				Reduce tidal exchange along the bay rim.	D																														
				Reduce wave/wake energy impacts to the Fringing Marshes.	D																														
				Retain sediments in the fringing marsh.	G																														
				Sustain productive fish and wildlife habitats.	F																														
	EU2-5 Shoreline/Barrier Islands	Function disruption due to subsidence, wave/wake energy, tidal exchange, and sediment disruptions.	High loss of brackish/saline marsh and beach/dune/back barrier marsh, decreased fisheries and wildlife, and high reduction in storm attenuation.	Introduce sediments to the Shoreline/Barrier Islands.	C																														
				Reduce tidal exchange along the bay rim.	D				+		+		+		+		+																		
				Sustain productive fish and wildlife habitats along the Shoreline/Barrier Islands.	F				+		+	+	+		+		+																		
				Reduce wave/wake energy impacts to the Shoreline/Barrier Islands.	D				+		+	+	+		+		+																		
	EU2-6 Delta	Function disruption due to subsidence, wave/wake energy, and direct removal of sediments.	Moderate reduction in storm attenuation.	Maximize sediment and freshwater into the Delta area.	C																														
				Prevent direct removal of sediment within the Delta.	G																														
				Reduce wave/wake energy impacts to the Delta.	D																														

* Ecosystems Unit Future Risk, percent changed: L= Low Loss (1-15); M = Moderate Loss (16-49); H = High Loss (< 5); Increase (I); Not Applicable (NA); Steady (S); Decrease (D); Increase (I); Unknown (U)
** Alternative Plan (Measure used in Alternative Plans)

Coastwide Objectives:
A - Reduce storm damage vulnerability of coastal communities, resources, and infrastructure.
B - Minimize exposure of traditional flood protection measures to open Gulf conditions.
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E - Establish or maintain dynamic salinity gradients that reflect natural cycles of freshwater availability and marine forcing (fluctuation related to normal daily and seasonal tide action or exchange).
F - Sustain productive and diverse wildlife habitats.
G - Maximize retention of river-borne sediments and nutrients within coastal wetlands.

Ecosystem Units Table Legend			
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Measures:

1. USACE Levee Alignment No. 1: Hurricane protection (30-ft. storm surge @ the coastline) along the GIWW south from Golden Meadow to City Price, modified to include Lafitte and Barataria.
2. New Orleans to Venice Hurricane Protection Project (HPP): City Price to Venice segment - Improve existing levees to provide 100 year storm frequency level of protection.
3. Grand Isle and Vicinity Project: Provide maximum technically feasible hurricane protection.
4. Complete/Accelerate the Louisiana Coastal Area (LCA), Louisiana Ecosystem Restoration Study Near-Term Plan including:
 - a. Barataria Basin Barrier Shoreline Restoration (Caminada Headland and Shell Island)
 - b. Small Bayou Lafourche Reintroduction
 - c. Medium Diversion with Dedicated Dredging at Myrtle Grove
 - d. Re-authorization of Davis Pond – Optimize for Marsh Creation
 - e. * Mississippi River Hydrodynamic Study
 - f. * Mississippi River Delta Management Study
 - g. * Third Delta Study
5. Barrier shoreline restoration projects – restoring the Barataria barrier islands.
6. Adaptive management through maintenance of West Bay crevasse.
7. Pipeline conveyance of sediment to create strategic marsh platforms in Fringing Marsh and Middle Basin Marsh areas, including the LA-1 Marsh Creation Project area.
8. Back fill and/or plug non-essential oil and gas canals.
9. * Develop a watershed management plan that redirects freshwater and sediment, storm water, and treated sewage water to sustain upper basin swamps and middle basin freshwater marsh.
10. Small diversions at strategic locations in upper basin.
11. Maximize beneficial use of dredge material where feasible.
12. * Strategize and implement plan to elevate and/or relocate assets located outside the hurricane protection plans.

* Not tied to specific geographic location.

Legend

- Adaptive Management through Crevasses
- Barrier Island Restoration
- Dredge Material Placement
- Freshwater Introduction
- Levee Alignment (100 yr. frequency)
- Levee Alignment (30' Storm Surge @ the Coastline)
- Sediment Delivery via Pipeline
- Shoreline Stabilization
- Beneficial Use of Dredge Material



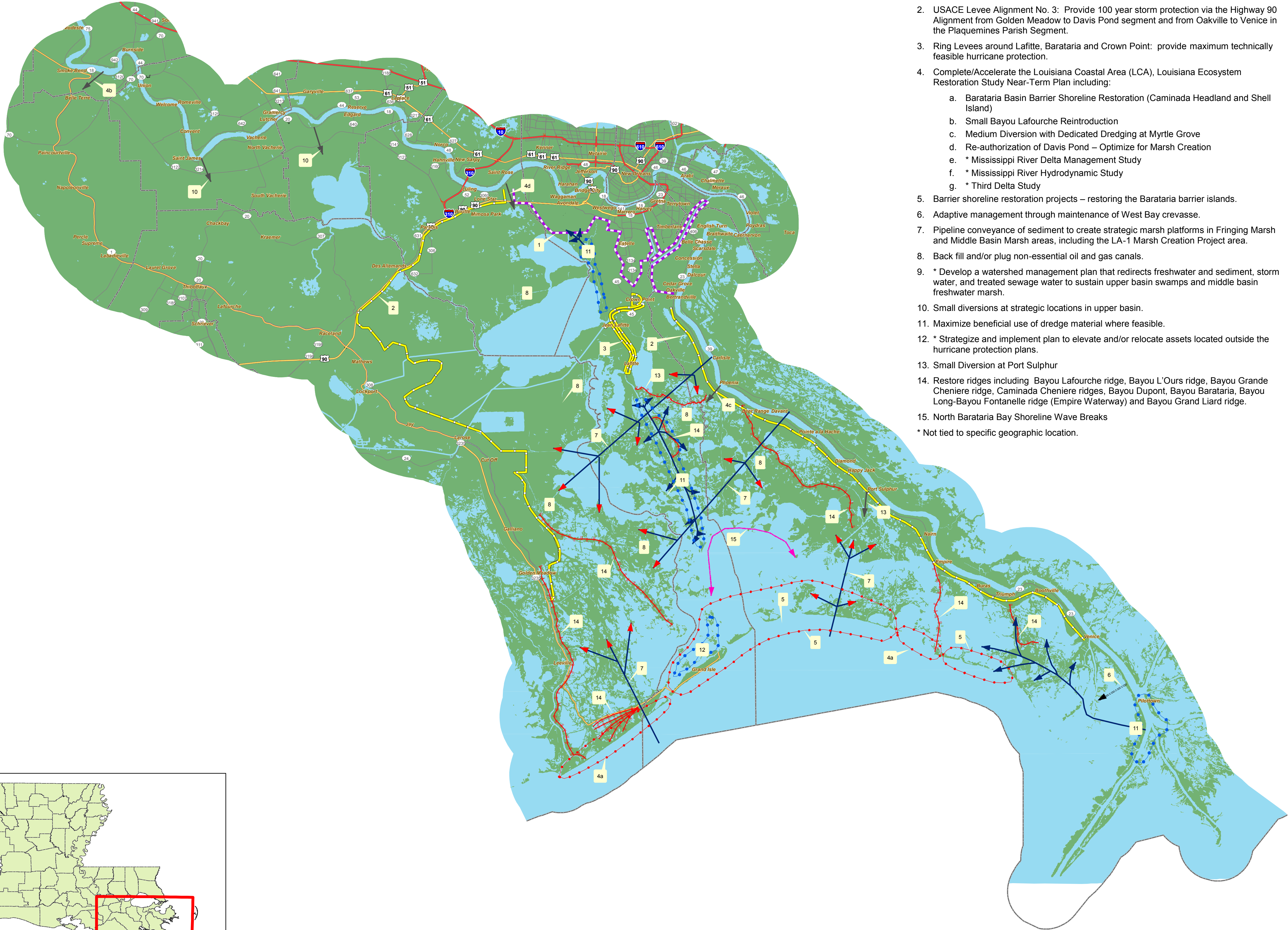
LOUISIANA COMPREHENSIVE COASTAL
PROTECTION MASTER PLAN

FIGURE 3.4

PLANNING UNIT 2
ALTERNATIVE ONE

Source: LCA - 2004; COAST 2050 - 1996; USACE - 2006; LADOTD - 2006

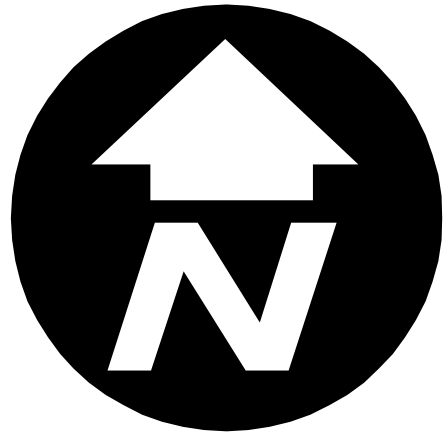
PROJECTION: Louisiana South, State Plane NAD 83 Feet



Measures:

1. West Bank Hurricane Protection Levee from Davis Pond to Oakville: improve existing levee to provide hurricane protection (30-ft. storm surge @ the coastline).
2. USACE Levee Alignment No. 3: Provide 100 year storm protection via the Highway 90 Alignment from Golden Meadow to Davis Pond segment and from Oakville to Venice in the Plaquemines Parish Segment.
3. Ring Levees around Lafitte, Barataria and Crown Point: provide maximum technically feasible hurricane protection.
4. Complete/Accelerate the Louisiana Coastal Area (LCA), Louisiana Ecosystem Restoration Study Near-Term Plan including:
 - a. Barataria Basin Barrier Shoreline Restoration (Caminada Headland and Shell Island)
 - b. Small Bayou Lafourche Reintroduction
 - c. Medium Diversion with Dedicated Dredging at Myrtle Grove
 - d. Re-authorization of Davis Pond – Optimize for Marsh Creation
 - e. * Mississippi River Delta Management Study
 - f. * Mississippi River Hydrodynamic Study
 - g. * Third Delta Study
5. Barrier shoreline restoration projects – restoring the Barataria barrier islands.
6. Adaptive management through maintenance of West Bay crevasse.
7. Pipeline conveyance of sediment to create strategic marsh platforms in Fringing Marsh and Middle Basin Marsh areas, including the LA-1 Marsh Creation Project area.
8. Back fill and/or plug non-essential oil and gas canals.
9. * Develop a watershed management plan that redirects freshwater and sediment, storm water, and treated sewage water to sustain upper basin swamps and middle basin freshwater marsh.
10. Small diversions at strategic locations in upper basin.
11. Maximize beneficial use of dredge material where feasible.
12. * Strategize and implement plan to elevate and/or relocate assets located outside the hurricane protection plans.
13. Small Diversion at Port Sulphur
14. Restore ridges including Bayou Lafourche ridge, Bayou L'Ours ridge, Bayou Grande Cheniere ridge, Caminada Cheniere ridges, Bayou Dupont, Bayou Barataria, Bayou Long-Bayou Fontanelle ridge (Empire Waterway) and Bayou Grand Liard ridge.
15. North Barataria Bay Shoreline Wave Breaks

* Not tied to specific geographic location.



0 2.5 5 10 15
Miles

1:316,800
1 inch equals 5 miles

Legend

- Adaptive Management through Crevasse
- Barrier Island Restoration
- Dredge Material Placement
- Freshwater Introduction
- Levee Alignment (100 yr frequency)
- Levee Alignment (30' Storm Surge @ the Coastline)
- Ridge Restoration
- Sediment Delivery via Pipeline
- Shoreline Protection
- Shoreline Restoration
- Beneficial Use of Dredge Material



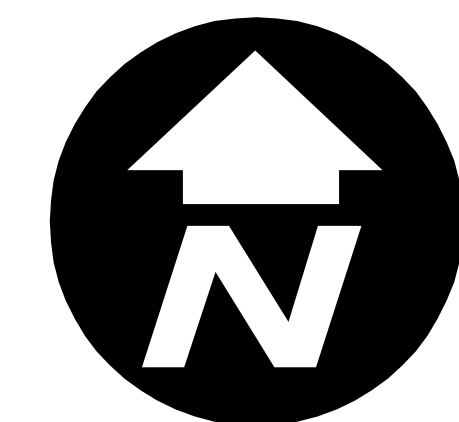
LOUISIANA COMPREHENSIVE COASTAL
PROTECTION MASTER PLAN

FIGURE 3.5

PLANNING UNIT 2
ALTERNATIVE TWO

SOURCE: LCA - 2004; COAST 2050 - 1996; USACE - 2006; LADOTD - 2006

PROJECTION: LOUISIANA SOUTH, STATE PLANE NAD 83 FEET



1:253,440
1 inch equals 4 miles

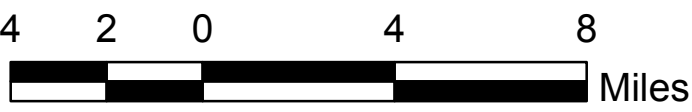
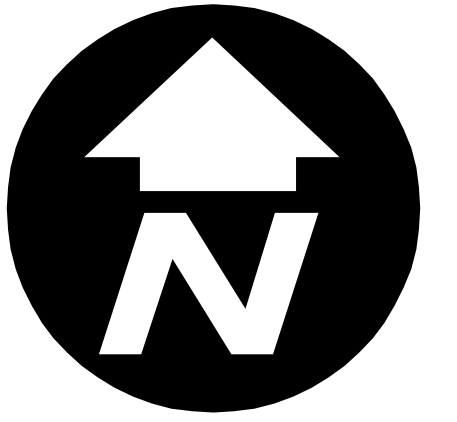
Legend

- | | |
|------------------------|-----------------|
| Land | Limited Access |
| Water | Highways |
| Planning Unit Boundary | Secondary Roads |
| Parish Boundary | Other |
| State Offshore Area | Highway Ramp |



LOUISIANA COMPREHENSIVE COASTAL
PROTECTION MASTER PLAN

FIGURE 4.1
PLANNING UNIT 3A
BOUNDARY AND BASE MAP



1:253,440
1 inch equals 4 miles

Legend

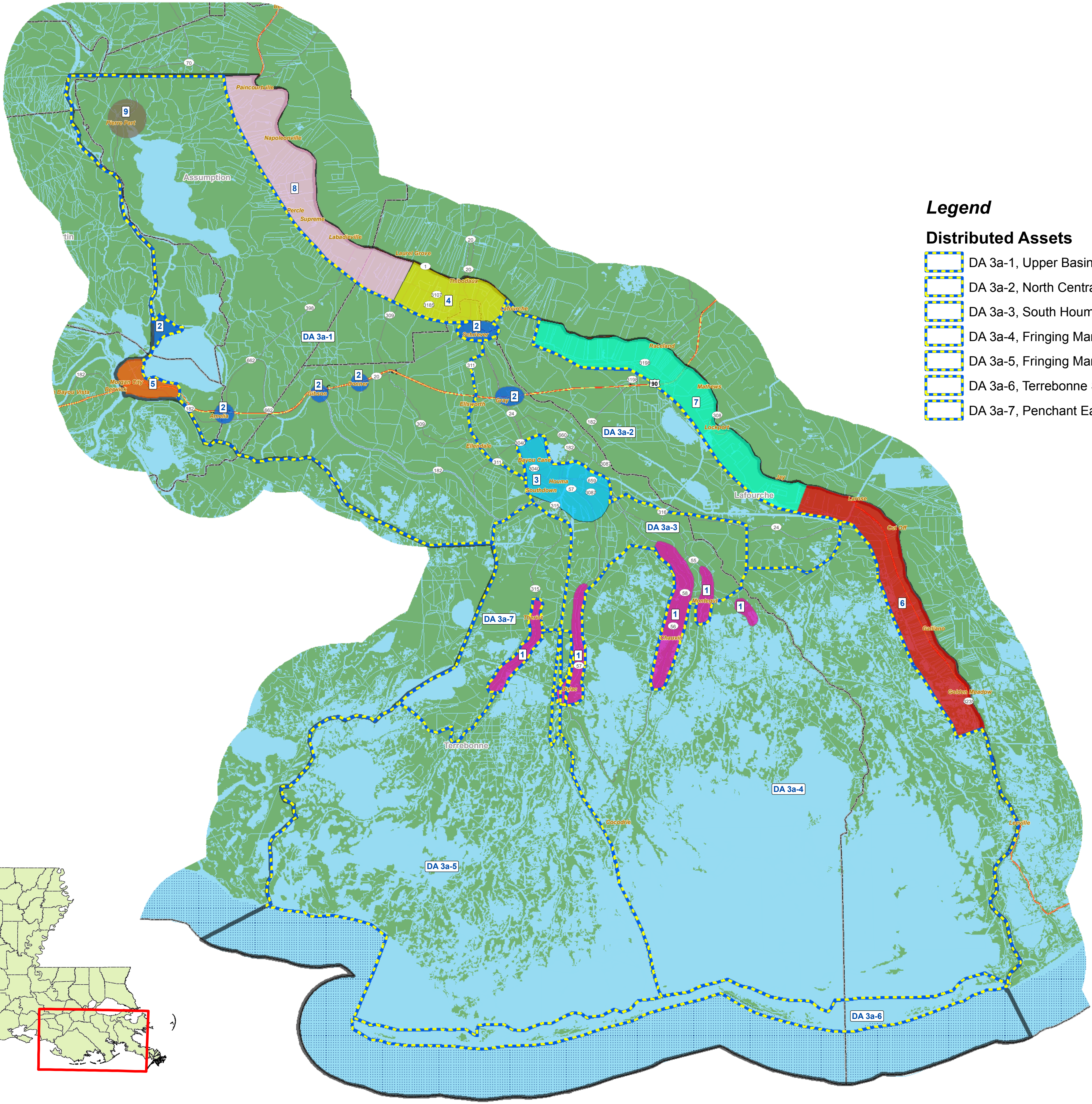
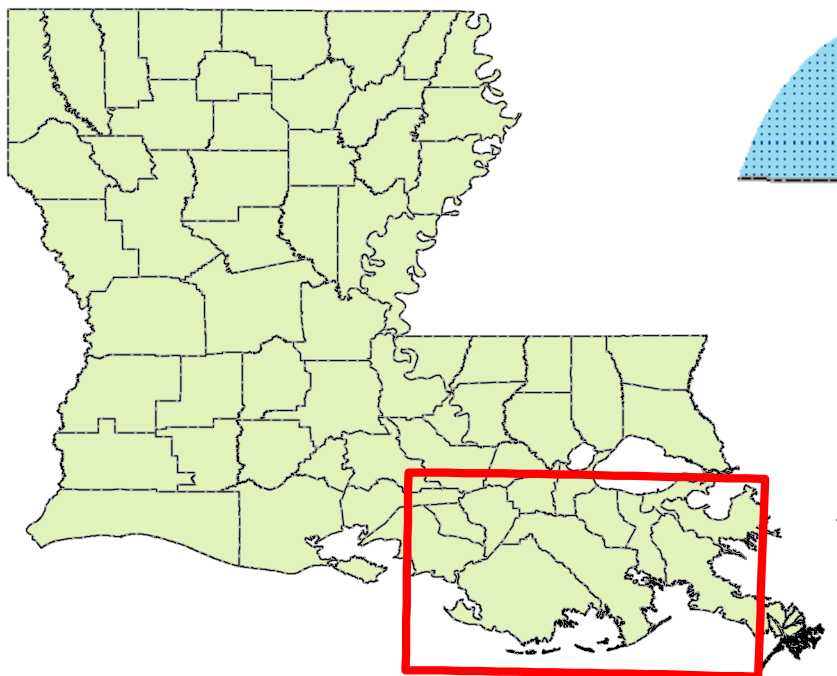
Distributed Assets

- DA 3a-1, Upper Basin Swamp
- DA 3a-2, North Central Terrebonne Wetlands
- DA 3a-3, South Houma Swamps
- DA 3a-4, Fringing Marshes East
- DA 3a-5, Fringing Marshes West
- DA 3a-6, Terrebonne Shoreline
- DA 3a-7, Penchant East

Concentrated Assets

- 1, South of Houma
- 2, HWY 198 & HWY 20
- 3, Houma
- 4, Thibodaux
- 5, Morgan City
- 6, South Lafourche
- 7, Central Lafourche
- 8, North Lafourche, Assumption, & Ascension
- 9, Stephenville & Pierre Part

- Planning Unit Boundary
- Parish Boundary
- State Offshore Area



LOUISIANA COMPREHENSIVE COASTAL
PROTECTION MASTER PLAN

FIGURE 4.2

**PLANNING UNIT 3A
CONCENTRATED AND DISTRIBUTED ASSETS**

PLANNING UNIT 3a: Bayou Lafourche to Bayou de West / Bay Junop

Table 4.1 Relative Damages from Storm Surge to Concentrated Assets

Proportion of assets damaged or destroyed due to storm surge: EL = Extremely Low (0-5%) L = Low (5 - 15%) M = Medium (15 - 25%) H = High (25 - 50%) EH = Extremely High (>50%)	Storm Surge at Coastline (Feet)	South of Houma	Hwy 182 & 20	Houma	Thibodeaux	Morgan City	South Lafourche	Central Lafourche	North Lafourche, Assumption & Acension	Stephensville & Pierre Port
	5	EL	EL	EL	EL	EL	EL	EL	EL	EL
	10	H	L	L	EL	EL	EL	L	EL	M
	15	EH	L	M	L	L	H	M	EL	H
	20	EH	M	H	L	M	EH	H	L	EH
	25	EH	H	EH	H	H	EH	EH	L	EH
	30	EH	EH	EH	EH	EH	EH	EH	L	EH

Table 4.2 Concentrated Assets Scoring

Scoring Criteria	Storm Surge at Coastline (Feet)	South of Houma	Hwy 182 & 20	Houma	Thibodeaux	Morgan City	South Lafourche	Central Lafourche	North Lafourche, Assumption & Acension	Stephensville & Pierre Port
1. Residences	25	12	12	17	15	15	8	12	12	5
2. Industry	20	5	8	15	12	12	9	10	9	5
3. Infrastructure	15	5	7	10	8	10	9	8	5	2
4. Institutional and Publicly Owned Facilities	20	5	7	12	11	10	11	11	9	5
5. Strategic Resources	20	6	8	18	10	12	10	8	6	5
Total Score	100	33	42	72	56	59	47	49	41	22

Table 4.3 Relative Damages from Storm Surge to Distributed Assets¹

Proportion of assets damaged or destroyed due to storm surge: EL = Extremely Low (0-5%) L = Low (5 - 15%) M = Medium (15 - 25%) H = High (25 - 50%) EH = Extremely High (>50%)	Storm Surge at Coastline (Feet)	DA 3a-1 Upper Basin Swamp	DA 3a-2 NC Terrebonne Wetlands	DA 3a-3 South Houma Swamps	DA 3a-4 Fringing Marshes East	DA 3a-5 Fringing Marshes West	DA 3a-6 Terrebonne Shoreline	DA 3a-7 Penchant East
	5	EL	EL	EL	EL	EL	L	L
	10	L	L	M	M	M	H	M
	15	M	M	H	H	H	EH	H
	20	H	H	EH	EH	EH	EH	EH
	25	EH	EH	EH	EH	EH	EH	EH
	30	EH	EH	EH	EH	EH	EH	EH

¹ Assets outside of the defined concentrated areas (see Concentrated and Distributed Assets Map)

Table 4.4 Scoring of Distributed Assets

Scoring Criteria	Maximum Score for Resources	DA 3a-1 Upper Basin Swamp	DA 3a-2 NC Terrebonne Wetlands	DA 3a-3 South Houma Swamps	DA 3a-4 Fringing Marshes East	DA 3a-5 Fringing Marshes West	DA 3a-6 Terrebonne Shoreline	DA 3a-7 Penchant East
National Significance	25	25	25	15	20	20	15	15
State Significance	25	25	25	20	20	20	15	15
Local Significance	25	25	25	25	20	20	15	20
Critical to Recovery	25	25	25	15	15	15	10	10
Total Score	100	100	100	75	75	75	55	60

NOTE: Morganza to the Gulf is not authorized and is not included.

TABLE 4.5. DISTRIBUTED ASSETS FOR PLANNING UNIT 3a

The land outside the defined communities was divided into areas of surge impact commonality. For Planning Unit 2 these are defined by the significant water bodies that impact these areas:

Upper Basin Swamp	= DA 3a-1	Table
NC Terrebonne Wetlands	= DA 3a-2	
South Houma Swamps	= DA 3a-3	
Fringing Marshes East	= DA 3a-4	
Fringing Marshes West	= DA 3a-5	
Terrebonne Shoreline	= DA 3a-6	
Penchant East	= DA 3a-7	

Within these areas following assets are comprised:

	Assets	Oil & Gas	Pipelines	Highway, Bridges & Transportation	Evacuation Routes	Ports, Waterway & Infrastructure	Other Strategic Assets
DA 3a-1	Oil & Gas Fields and Pipelines	X	X				
	Hwy 90 (future I-49)			X	X		
	Hwy 182			X			
	Hwy 398			X			
	Hwy 70			X			
	Port of Morgan City					X	
DA 3a-2	Oil & Gas Fields and Pipelines	X	X				
	Hwy 24			X			
	Hwy 90 (future I-49)			X	X		
	Future TP Evacuation Route				X		
	GIWW					X	
	Bayou Terrebonne					X	
DA 3a-3	Oil & Gas Fields and Pipelines	X	X				
	Hwy 55			X	X		
	Hwy 56			X	X		
	Hwy 57			X	X		
	Hwy 58			X	X		
	Hwy 315			X	X		
	Hwy 665			X	X		
	5 community Bayou's					X	
	Houma Navigation Canal					X	

	Assets	Oil & Gas	Pipelines	Highway, Bridges & Transportation	Evacuation Routes	Ports, Waterway & Infrastructure	Other Strategic Assets
DA 3a-4	Oil & Gas Fields and Pipelines	X	X				
	Cocodrie Docks					X	
	Lumcon						X
	Hwy 56			X	X		
	Houma Navigation Canal					X	
DA 3a-5	Oil & Gas Fields and Pipelines	X	X				
	Houma Navigation Canal					X	
DA 3a-6	Oil & Gas Fields and Pipelines	X	X				
	Houma Navigation Canal					X	
DA 3a-7	Oil & Gas Fields and Pipelines	X	X				
	Falgout Canal					X	
	Houma Navigation Canal					X	

Table 4.6. Planning Unit 3A Existing Conditions/ Problem Identification

NOTE: Rankings are only applicable within an ecosystem unit; the purpose is not to prioritize between units, but rather to prioritize function disruptions within ecosystem units.

Function Disruption (System Threat)	Ecosystem Unit						
	Upper Basin Swamp	NC Terrebonne Wetlands	South Houma Swamps	Fringing Marshes East	Fringing Marshes West	Terrebonne Shoreline/Barrier Islands	Penchant East
Subsidence	M	M	M	H	H	H	H
Tidal Exchange	NI	L	L	H	H	H	M
Sediment Disruptions	H	L	M	H	H	H	M
Salt Water Intrusion	NI	L	M	H	H	H	M
Altered Inundation	H	H	M	M	M	NI	M
Wave/Wake Energy	L	L	L	VH	VH	VH	L
Direct Removal	L	L	M	M	H	M	M

NC Terrebonne Wetlands = North Central Terrebonne Wetlands

No Impact	NI
Low	L
Moderate	M
High	H
Very High	VH

Subsidence = true subsidence; benchmark elevations not referenced to tide gauges

Tidal Exchange = daily tide energy; assumed to be more destructive to historically fresh/intermediate wetlands, more beneficial to brackish/saline wetlands

Sediment Disruptions = disconnection from riverine sources

Saltwater Intrusion = due to encroachment of Gulf on landscape edge or movement up canals & channels

Altered Inundation = altered frequency or duration of inundation, not related to RSLR; e.g., impoundments

Wave/Wake Energy = includes storm energy

Direct Removal = dredging sediments or covering by spoil banks & levees.

Table 4.7. Planning Unit 3A Changes in Natural Resources, 1990 - 2050 (From Coast 2050 Report; LCA Land Change Map)

Resource	Ecosystem Unit						
	EU 3a-1 Upper Basin Swamp	EU 3a-2 NC Terrebonne Wetlands	EU 3a-3 South Houma Swamps	EU 3a-4 Fringing Marshes East	EU 3a-5 Fringing Marshes West	EU 3a-6 Shoreline/ Barrier Islands	EU 3a -7 Penchant East
Swamp	M	NA	NI	NA	NA	NA	NI
Fresh/Intermediate Marsh	NA	M	L	NA	NA	NA	M
Brackish/Saline Marsh	NA	NA	NA	H	M	NA	NA
Beach/Dune/Back Barrier Marsh	NA	NA	NA	NA	NA	H	NA
Sessile Estuarine (Oysters)	NI	NI	S	S	S	D	I
Saltwater (Red Drum)	NI	NI	D	D	D	D	D
Freshwater (Largemouth Bass)	I	I	I	I	D	NI	I
Estuarine (Spotted Seatrout)	NI	NI	D	D	D	D	D
Estuarine (Shrimp)	NI	NI	D	D	D	D	D
Woodland Edge (Deer)	D	S	D	D	S	NI	S
Woodland Avifauna	S	NI	D	S	NI	D	S
Fresh Wetlands (Alligator)	I	S	S	D	D	D	I
Muskrat	S	S	S	D	D	NI	D
Shore Birds	NI	S	NI	D	D	D	D
Loss of Storm Attenuation***	M	M	NI	M	M	M	M

Wetland Key

No Impact	NI
Low Loss	L
Moderate Loss	M
High Loss	H
Increase	I
Not Applicable	NA

% Change

0
1-15
16-49
>50

Fish & Wildlife Key

No Impact/Not historically present	NI
Steady	S
Decrease	D
Increase	I
Unknown (No information)	U

NOTES:

* = Small acreage by percentage w/in ecosys unit

** = Lake Pontchartrain Atlas

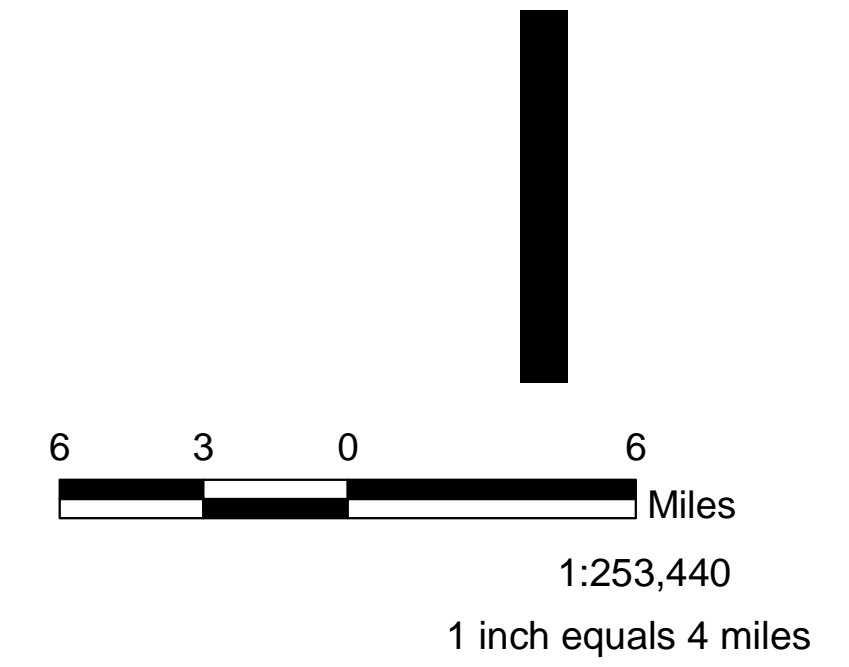
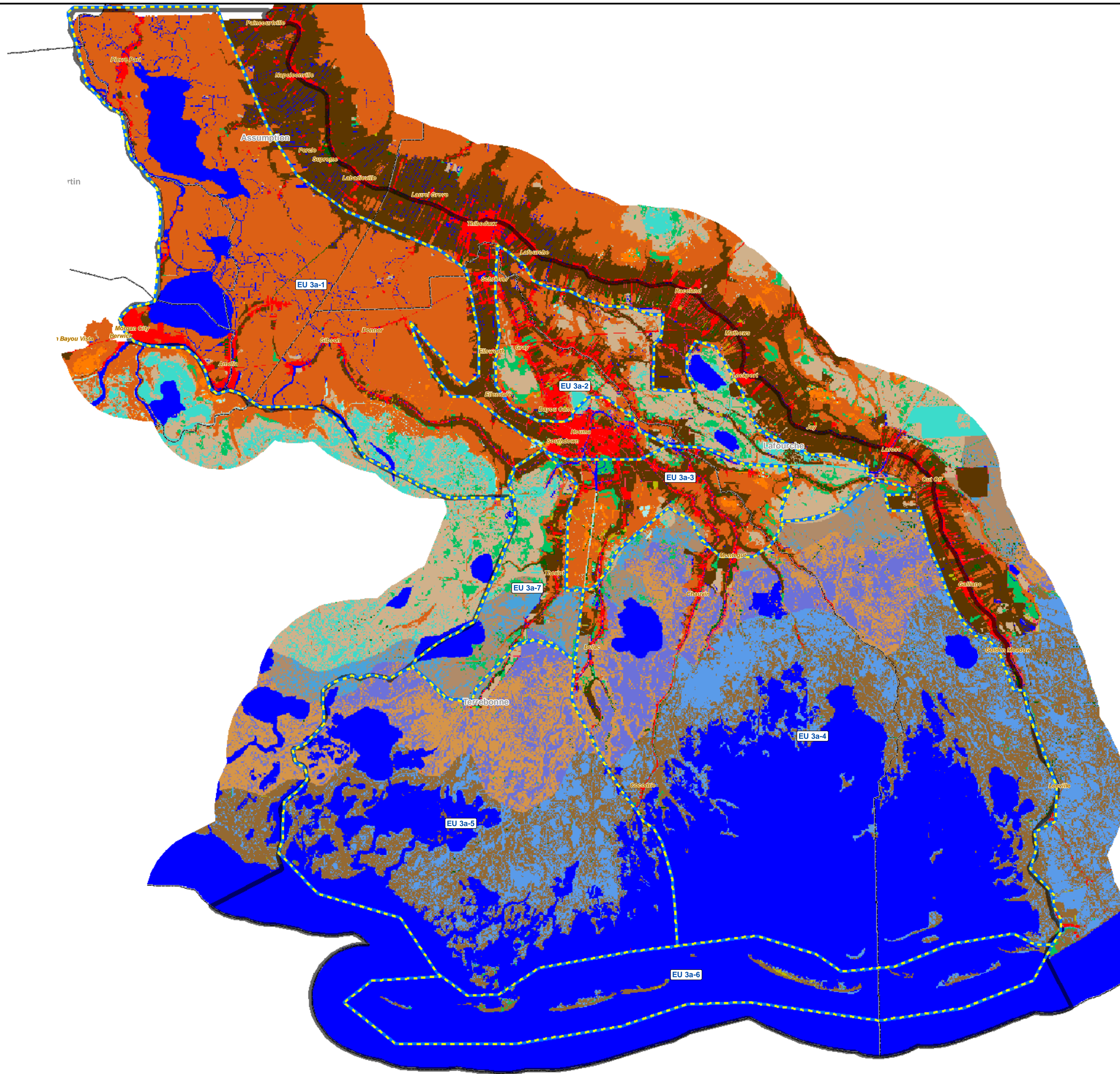
*** = Using land change as the surrogate for changes in storm attenuation capacity

- Legend**
- Ecological Units**
EU_Desc, DESC_
- EU 3a-1, Upper Basin Swamp
 - EU 3a-2, NC Terrebonne Wetlands
 - EU 3a-3, South Houma Swamps
 - EU 3a-4, Fringing Marshes East
 - EU 3a-5, Fringing Marshes West
 - EU 3a-6, Terrebonne Shoreline
 - EU 3a-7, Penchant East

- Fresh Marsh
- Intermediate Marsh
- Brackish Marsh
- Saline Marsh
- Non-wetland
- Swamp
- Gap Wetland Forest
- Gap Wetland Shrub/Scrub
- Gap Upland Shrub/Scrub
- Gap Ag/Pasture
- Gap Developed
- Gap Barren
- Water
- Water-fresh zone
- Water-intermediate zone
- Water-brackish zone
- Water-saline zone
- Water-swamp zone



Map Document: (K:\DNR\GIS_Documents\Project_Maps\MXD\Area 3a\Final\dnr_area_3a_0002_Natural Resources.mxd)
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LOUISIANA DEPARTMENT OF
NATURAL RESOURCES

FIGURE 4.3
PLANNING UNIT 3A
NATURAL RESOURCES

Table 4.8a Planning Unit 3A: Objectives and Measures Table - Concentrated Assets

	Geographic Location	Current Issues*	Future Risk/Impact	Planning Unit Objective	Coastal Objectives	Measures																													
						1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	
						Initiate the LA-1 Marsh creation Project	Backfill Pipeline Canals	Bayou Lafourche 1000 ds	Convey Atchafalaya River Water to Terrebonne Marsh	Freshwater Introduction South of Lake Decade (Avoca	Freshwater Introduction via Blue Hammock Bayou	Maintain Land Bridge Between Bayous Du Large and Grand Bayou	Maintain Land Bridge Between Calillou Lake and Gulf of Mexico	Maintain Timberler Land Bridge	Multi-Purpose Operation of the Houma Navigational Canal Lock System	Optimize flows and Atchafalaya River Influence in Penchant Basin	Rehabilitate Northern Shorelines of Terrebonne/Timbalier Bays	Restore Terrebonne Barrier Islands	Alternative Operational Schemes of the Old River Control	Lower Water Levels in Upper Penchant	Enhance Atchafalaya Flow to Lower Penchant	Improve Hydrology and Drainage in the Verret Sub-basin	Stabilize Banks of Navigation Channels for Water Conveyance	Morganza to the Gulf of Mexico Hurricane Protection Study	State/Parish Barrier Plan (Reaches, 1,2 and 3)	Reach 5 (LHR) and Reach 6 (HMCR) Storm Surge Protection	Madison Bay Marsh Creation and Terracing Project	West Bell Pass Barrier Headland Restoration Project	Falgout Canal Freshwater Enhancement Project	Timbalier Island East Restoration	Pipeline Conveyance of sediment to create marsh platform	Protection to distributed assets by elevated structures and protbed hurricane routes	Internal levee alignment	Maximize beneficial use of dredge material where possible	
Concentrated Assets	South of Houma	Extremely high flood risk to Concentrated Assets with storm surges over 15 ft.	Loss of Concentrated Assets due to permanent erosion/flooding.	Provide coastal protection to South of Houma Concentrated Assets.	A, B, D							+	+									+				+		+				+			
				Protect LA- 56 from Cocodrie to LA- 57	A,B,D																		+	+	+				+						
	Hwy 182 & 20	High level of flood risk to Concentrated Assets with storm surges over 25 ft.	Increased flood risk to assets due to sea level rise, subsidence, and wetland loss.	Provide coastal protection to Hwy 182 & 20 Concentrated Assets.	A,B																	+		+	+		+		+						
	Houma	Extremely high flood risk to Concentrated Assets with storm surges over 25 ft.	Increased flood risk to assets due to sea level rise, subsidence, and wetland loss.	Provide coastal protection to Houma Concentrated Assets.	A,B																	+	+		+		+		+			+			
	Thibodeaux	High level of flood risk to Concentrated Assets with storm surges over 25 ft.	Increased flood risk to assets due to sea level rise, subsidence, and wetland loss.	Provide coastal protection to Thibodeaux Concentrated Assets.	A,B																	+	+		+			+							
	Morgan City	High level of flood risk to Concentrated Assets with storm surges over 25 ft.	Increased flood risk to assets due to sea level rise, subsidence and wetland loss.	Provide coastal protection to Morgan City Concentrated Assets.	A,B													+		+		+		+											
	South Lafourche	Extremely high flood risk to Concentrated Assets with storm surges over 20 ft.	Significantly increased flood risk due to wetland loss exposing defence structures to open Gulf conditions.	Provide coastal protection to South Lafourche Concentrated Assets.	A,B	+																+		+	+					+					
				Protect LA-+ from Leeville to Golden Meadow to Leon Theriot Lock	A,B,D	+																	+		+	+					+				
	Central Lafourche	Extremely high flood risk to Concentrated Assets with storm surges over 25 ft.	Increased flood risk to assets due to sea level rise, subsidence, and wetland loss.	Provide coastal protection to Central Lafourche Concentrated Assets.	A,B	+																+		+	+										
	North Lafourche, Assumption, and Acension	Low level of flood risk to Concentrated Assets.	Increased flood risk to assets due to sea level rise, and subsidence, and wetland loss.	Provide coastal protection to North Lafourche, Assumption, and Acension Concentrated Assets.	A,B														+		+		+		+										
	Stephensville & Pierre Part	Low level of flood risk to Concentrated Assets.	Increased flood risk to assets due to sea level rise, subsidence, and wetland loss.	Provide coastal protection to Stephensville & Pierre Part Concentrated Assets.	A,B														+		+		+		+										

* Current issues, percent flooded: H = High (25-50%); EH= Extremely High (> 50%)
** Alternative Plan (Measure used in Alternative Plans)

Coastwide Objectives:
A - Reduce storm damage vulnerability of coastal communities, resources, and infrastructure.
B - Minimize exposure of traditional flood protection measures to open Gulf conditions.
C - Increase sediment input from sources outside estuarine basins, and manage existing sediment resources within estuarine basines, to sustain and rejuvenate existing wetlands, rebuild marsh substrate and construct flood protections projects.
D - Maintain or establish natural landscape features and hydrologic processes that are critical to sustainable ecosystems structure and function, including dissipation of storm energy.
E - Establish or maintain dynamic salinity gradients that reflect natural cycles of freshwater availability and marine forcing (fluctuation related to normal daily and seasonal tide action or exchange).
F - Sustain productive and diverse wildlife habitats.
G - Maximize retention of river-borne sediments and nutrients within coastal wetlands.

Table 4.8b Planning Unit 3A: Objectives and Measures Table - Distributed Assets

	Geographic Location	Current Issues*	Future Risk/Impact	Planning Unit Objective	Coastal Objectives	Measures																													
						1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	
						Initiate the LA-1 Marsh creation Project	Backfill Pipeline Canals	Bayou Lafourche 1000 cfs	Convey Atchafalaya River Water to Terrebonne Marshes	Freshwater Introduction South of Lake Decade (Avoca Is	Freshwater Introduction via Blue Hammock Bayou	Maintain Land Bridge Between Bayous Du Large and Grand Bayou	Maintain Land Bridge Between Calilou Lake and Gulf of Mexico	Maintain Timberler Land Bridge	Multi-Purpose Operation of the Houma Navigational Canal Lock System	Optimize flows and Atchafalaya River Influence in Penchant Basin	Rehabilitate Northern Shorelines of Terrebonne/Timbalier Bays	Restore Terrebonne Barrier Islands	Alternative Operational Schemes of the Old River Control	Lower Water Levels in Upper Penchant	Enhance Atchafalaya Flow to Lower Penchant	Improve Hydrology and Drainage in the Verret Sub-basin	Stabilize Banks of Navigation Channels for Water Conveyance	Morganza to the Gulf of Mexico Hurricane Protection Study	State/Parish Barrier Plan (Reaches, 1,2, and 3)	Reach 5 (LHR) and Reach 6 (HMCR) Storm Surge Protection	Madison Bay Marsh Creation and Terracing Project	West Bell Pass Barrier Headland Restoration Project	Falgout Canal Freshwater Enhancement Project	Timbalier Island East Restoration	Pipeline Conveyance of sediment to create marsh platform	Protection to distributed assets by elevated structures and protected hurricane routes	Internal levee alignment	Maximize beneficial use of dredge material where possible	
Distributed Assets	DA3a-1 Upper Basin Swamp	Extremely high level of flood risk to Distributed Assets with storm surges over 25 ft.	Increased flood risk to assets due to sea level rise, subsidence, and wetland loss.	Provide coastal protection to Port of Morgan City.	A,B													+		+		+	+			+		+	+						
				Provide coastal protection to oil and gas fields and pipelines.	A,B															+		+		+	+			+		+	+				
				Provide coastal protection to Highways and Evacuation Routes.	A,B																+		+		+			+		+	+				
	DA3a-2 North Central Terrebonne Wetlands (NCTW)	Extremely high level of flood risk to Distributed Assets with storm surges over 25 ft.	Increased flood risk to assets due to sea level rise, subsidence and wetland loss.	Provide coastal protection to GIWW & Bayou Terrebonne.	A,B																	+						+	+			+			
				Provide coastal protection to oil and gas fields and pipelines.	A,B															+		+		+				+	+					+	
				Provide coastal protection to Highways and Evacuation Routes.	A,B																+		+		+				+	+				+	
	DA3a-3 South Houma Swamps	Extremely high level of damage to Distributed Assets with storm surges over 20 ft.	Loss of Distributed Assets due to permanent erosion/flooding.	Provide coastal protection to 5 community bayou's and Houma navigation channel.	A,B																+								+			+			
				Reduce storm surge impacts of 5 community bayou's and Houma navigation channel.	A,B																		+		+					+			+		
				Provide coastal protection to oil and gas fields and pipelines.	A,B																	+		+		+				+			+		
				Provide coastal protection to Highways and Evacuation Routes.	A,B																		+		+					+			+		
	DA3a-4 Fringing Marshes East	Extremely high level of damage to Distributed Assets with storm surges over 20 ft.	Loss of Distributed Assets due to permanent erosion/flooding.	Provide coastal protection to Houma navigation channel.	A,B																	+			+					+			+		
				Reduce storm surge impacts of Houma navigation canal.	A,B																				+					+			+		
				Provide coastal protection to oil and gas fields and pipelines.	A,B				-															+		+				+			+		
				Provide coastal protection to Highways, Evacuation Routes and LUMCON.	A,B																		+							+			+		
	DA3a-5 Fringing Marshes West	Extremely high level of damage to Distributed Assets with storm surges over 20 ft.	Loss of Distributed Assets due to permanent erosion/flooding.	Provide coastal protection to Houma navigation channel.	A,B						+	+	+	+		+						+							+						
				Reduce storm surge impacts of the Houma Navigation Canal, Bush/Boudraux Canal, Cutoff Canal, Falgout Canal, Robinson Canal, and	A,B								+	+	+			+						+						+					
				Provide coastal protection to oil and gas fields and pipelines.	A,B								+	+	+			+						+						+					
	DA3a-6 Terrebonne Shoreline/Barrier Islands	Extremely high level of damage to Distributed Assets with storm surges over 15 ft.	Loss of Distributed Assets due to permanent erosion/flooding.	Provide coastal protection to Houma navigation channel.	A,B						+	+	+	+		+						+													
				Reduce storm surge impacts of the Houma Navigation Canal, Bush/Boudraux Canal, Cutoff canal, Falgout Canal, Robinson Canal, anc	A,B								+	+	+			+	+					+						+					
				Provide coastal protection to oil and gas fields and pipelines.	A,B													+	+					+						+					
	DA3a-7 Penchant East	Extremely high level of damage to Distributed Assets with storm surges over 20 ft.	Increased flood risk to assets due to sea level rise, subsidence, and wetland loss.	Provide coastal protection to Houma Navigation Canal and Falgout Canal.	A,B												+					+							+						
				Reduce storm surge impacts of Houma Navigation Canal.	A,B														+				+												
				Provide coastal protection to oil and gas fields and pipelines.	A,B			+		-	-	+	+	+				+						+											

* Current issues, percent flooded: H = High (25-50%); EH= Extremely High (> 50%)
** Alternative Plan (Measure used in Alternative Plans)

Coastwide Objectives:
A - Reduce storm damage vulnerability of coastal communities, resources, and infrastructure.
B - Minimize exposure of traditional flood protection measures to open Gulf conditions.
C - Increase sediment input from sources outside estuarine basins, and manage existing sediment resources within estuarine basines, to sustain and rejuvenate existing wetlands, rebuild marsh substrate and construct flood protections projects.
D - Maintain or establish natural landscape features and hydrologic processes that are critical to sustainable ecosystems structure and function, including dissipation of storm energy.
E - Establish or maintain dynamic salinity gradients that reflect natural cycles of freshwater availability and marine forcing (fluctuation related to normal daily and seasonal tide action or exchange).
F - Sustain productive and diverse wildlife habitats.
G - Maximize retention of river-borne sediments and nutrients within coastal wetlands.

Table 4.8c Planning Unit 3A: Objectives and Measures Table - Distributed Assets

	Geographic Location	Current Issues	Future Risk/Impact*	Planning Unit Objective	Coastal Objectives	Measures																														
						1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29		
						Initiate the LA-1 Marsh creation Project	Backfill Pipeline Canals	Bayou Lafourche 1000 ds	Convey Atchafalaya River Water to Terrebonne Marsh	Freshwater Introduction South of Lake Decade (Avoca	Freshwater Introduction via Blue Hammock Bayou	Maintain Land Bridge Between Bayous Du Large and Grand Bayou	Maintain Land Bridge Between Caillou Lake and Gulf of Mexico	Maintain Timberlall Land Bridge	Multi-Purpose Operation of the Houma Navigational Canal Lock System	Optimize flows and Atchafalaya River Influence in Penchant Basin	Rehabilitate Northern Shorelines of Terrebonne/Timbalier Bays	Restore Terrebonne Barrier Islands	Alternative Operational Schemes of the Old River Control	Lower Water Levels in Upper Penchant	Enhance Atchafalaya Flow to Lower Penchant	Improve Hydrology and Drainage in the Verret Sub-basin	Stabilize Banks of Navigation Channels for Water Conveyance	Morganza to the Gulf of Mexico Hurricane Protection Study	State/Parish Barrier Plan (Reaches, 1,2, and 3)	Reach 5 (LHR) and Reach 6 (HMCR) Storm Surge Protection	Madison Bay Marsh Creation and Terracing Project	West Bell Pass Barrier Headland Restoration Project	Falgout Canal Freshwater Enhancement Project	Timbalier Island East Restoration	Pipeline Conveyance of sediment to create marsh platform	Protection to distributed assets by elevated structures and protected hurricane routes	Internal levee alignment	Maximize beneficial use of dredge material where possible		
		ALT 1**	ALT 1,2	ALT 1, 2	ALT 2	ALT 2		ALT 1, 2		ALT 1, 2	ALT 2	ALT 2	ALT 1, 2		ALT 2	ALT 1	ALT 2	ALT 1	ALT 1, 2	ALT 1, 2	ALT 1, 2					ALT 1, 2	ALT 1, 2	ALT 1, 2	ALT 1, 2	ALT 2	ALT 1, 2					
Ecosystem Units	EU3a-1 Upper Basin Swamp	Function disruption due subsidence, freshwater/sediment disruption, and altered inundation.	Moderate loss of swamp habitat and reduction in storm attenuation.	Improve hydrologic conditions to promote cypress regeneration in the Upper Basin Swamps (UBS) such as Verret, Chacahoula.	A,C,E,F,G											+			+	+	-	+					+		+							
				Sustain productive fish and wildlife habitats in the Upper Basin Swamps (UBS)	F																															
				Introduce sediments to the Upper Basin Swamp.	A,C,D,G											+			+										+							
	EU3a-2 North Central Terrebonne Wetlands (NCTW)	Function disruption due to subsidence, freshwater/sediment disruption, and altered inundation.	Moderate loss of fresh/intermediate marsh and reduction in storm attenuation.	Improve natural hydrology as it relates to ecosystem benefits and storm surge reduction within the North Central Terrebonne Wetlands	A,C,E,F,G												+		+	+	+		+			+		+	+	+			+			
				Sustain productive fish and wildlife habitats in the North Central Terrebonne Wetlands (NCTW)	F																													+		
				Increase introduction of sediments into NCTW.	A,C,D,G												+			+		+			+		+	+	+	+				+		
	EU3a-3 South Houma Swamps	Function disruption due to subsidence, freshwater/sediment disruption, and salt water intrusion.	Decreased fisheries and reduction in storm attenuation.	Introduce sediments into the South Houma Swamps (SHS).	A,C,D,G				+											+		+		+		+	+	+	+			+				
				Reduce saltwater intrusion impacts of the 5 community bayou's and Houma navigation channel.	E				+							+	+			+				+		+	+	+	+				+			
				Reduce impounded areas inside the SHS.	D,E																	+			+		+							+		
				Sustain productive fish and wildlife habitats in South Houma Swamps (SHS)	F				+																									+		
				Minimize direct removal within the SHS.	D,E																	+			+		+							+		
				Reclaim the north of the Lake Boudreaux System and South of Houma Swamps Area	A, B, D,F				+	+					+																+			+		
	EU3a-4 Fringing Marshes East	Function disruption due to subsidence, wave/wake energy, tidal exchange, freshwater/sediment disruption, salt water intrusion, and direct removal.	High loss of brackish/saline marsh, decreased fisheries, fresh wetlands and shore birds, and high reduction in storm attenuation.	Introduce sediments to the Fringing Marshes East from the Mississippi River and Atchafalaya River.	C,D,E			+	+										+		+		+		+		+		+							
				Reduce saltwater intrusion impacts of the Houma Navigation Canal.	E				+					+			+	+	+				+	+		+		+		+						
				Sustain productive fish and wildlife habitats in Fringing Marshes East (FME)	F				+						+		+										+		+		+					
				Reduce deleterious tidal energy impacts within Fringing Marshes East (FME).	E		+	+	+			+	+	+			+	+			+				+		+		+		+					
				Reduce wave/wake energy impacts to the FME.	A,G							+	+	+			+	+								+		+		+		+				
				Protect and maintain the ridge.	D												+					+			+		+		+		+					

* Ecosystems Unit Future Risk, percent changed: L= Low Loss (1-15); M = Moderate Loss (16-49); H = High Loss (< 5); Increase (I); Not Applicable (NA); Steady (S); Decrease (D); Increase (I); Unknown (U)
** Alternative Plan (Measure used in Alternative Plans)

Coastwide Objectives:

A - Reduce storm damage vulnerability of coastal communities, resources, and infrastructure.

B - Minimize exposure of traditional flood protection measures to open Gulf conditions.

C - Increase sediment input from sources outside estuarine basins, and manage existing sediment resources within estuarine basines, to sustain and rejuvenate existing wetlands, rebuild marsh substrate and construct flood protections projects.

D - Maintain or establish natural landscape features and hydrologic processes that are critical to sustainable ecosystems structure and function, including dissipation of storm energy.

E - Establish or maintain dynamic salinity gradients that reflect natural cycles of freshwater availability and marine forcing (fluctuation related to normal daily and seasonal tide action or exchange).

F - Sustain productive and diverse wildlife habitats.

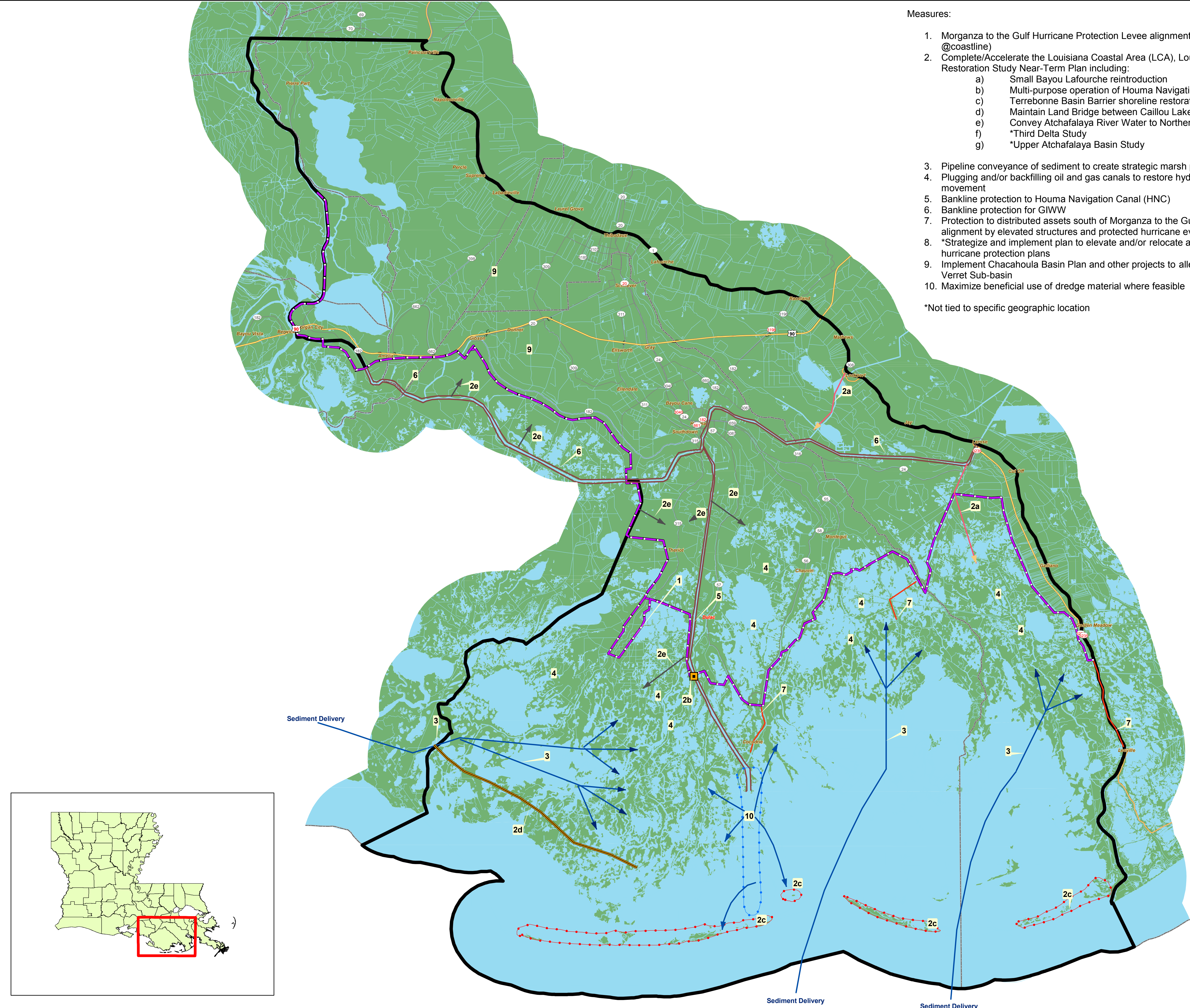
G - Maximize retention of river-borne sediments and nutrients within coastal wetlands.

Table 4.8c Planning Unit 3A: Objectives and Measures Table - Distributed Assets

	Geographic Location	Current Issues	Future Risk/Impact*	Planning Unit Objective	Coastal Objectives	Measures																														
						1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29		
						Initiate the LA-1 Marsh creation Project	Backfill Pipeline Canals	Bayou Lafourche 1000 cfs	Convey Atchafalaya River Water to Terrebonne Marsh	Freshwater Introduction South of Lake Decade (Avoca	Freshwater Introduction via Blue Hammock Bayou	Maintain Land Bridge Between Bayous Du Large and Grand Bayou	Maintain Land Bridge Between Callicou Lake and Gulf of Mexico	Maintain Timberlall Land Bridge	Multi-Purpose Operation of the Houma Navigational Canal Lock System	Optimize flows and Atchafalaya River Influence in Penchant Basin	Rehabilitate Northern Shorelines of Terrebonne/Timbalier Bays	Restore Terrebonne Barrier Islands	Alternative Operational Schemes of the Old River Control	Lower Water Levels in Upper Penchant	Enhance Atchafalaya Flow to Lower Penchant	Improve Hydrology and Drainage in the Verret Sub-basin	Stabilize Banks of Navigation Channels for Water Conveyance	Morganza to the Gulf of Mexico Hurricane Protection Study	State/Parish Barrier Plan (Reaches, 1, 2, and 3)	Reach 5 (LHR) and Reach 6 (HMCR) Storm Surge Protection	Madison Bay Marsh Creation and Terracing Project	West Bell Pass Barrier Headland Restoration Project	Falgout Canal Freshwater Enhancement Project	Timbalier Island East Restoration	Pipeline Conveyance of sediment to create marsh platform	Protection to distributed assets by elevated structures and protected hurricane routes	Internal levee alignment	Maximize beneficial use of dredge material where possible		
		ALT 1**	ALT 1, 2	ALT 1, 2	ALT 2	ALT 2		ALT 1, 2		ALT 1, 2	ALT 2	ALT 2	ALT 1, 2		ALT 2	ALT 1	ALT 2	ALT 1	ALT 1, 2	ALT 1, 2	ALT 1, 2					ALT 1, 2	ALT 1, 2	ALT 1, 2	ALT 2	ALT 1, 2						
Ecosystem Units	EU3a-5 Fringing Marshes West	Function disruption due to subsidence, wave/wake energy, tidal exchange, freshwater/sediment disruption, salt water intrusion, and direct removal.	Loss of brackish/saline marsh, decreased fisheries, fresh wetlands and shore birds, and reduction in storm attenuation.	Introduce sediments to the Fringing Marshes West from the Atchafalaya River.	C,D				+	+	+			+	+		+		+									+								
				Reduce saltwater intrusion impacts of the Houma Navigation channel.	E				+	+	+			+	+		+		+		+									+			+			
				Reduce deleterious tidal energy and salt water intrusion within Fringing Marshes West (FMW).	E			+	+	+	+	+	+	+	+		+	+	+		+		+								+			+		
				Sustain productive fish and wildlife habitats in Fringing Marshes West (FMW)	F				+	+	+						+														+					
				Reduce wave/wake energy impacts to the Fringing Marshes West.	A,G							+	+	+	+		+	+													+					
				Minimize direct removal within the FMW.	D																															
	EU3a-6 Terrebonne Shoreline/Barrier Islands	Function disruption due to subsidence, wave/wake energy, tidal exchange, freshwater/sediment disruption, and direct removal.	High loss of barrier and back barrier marsh, decrease in oysters, fisheries, fresh wetlands and shore birds, and reduction in storm attenuation.	Enhance and maintain the storm attenuation characteristics of the Barrier Islands.	D							+	+							+										+						
				Reduce saltwater intrusion impacts of the Houma navigation channel.	E											+			+									+		+						
				Enhance and maintain the ecosystem functions and values of the Barrier Islands.	D,F							+	+	+	+			+											+		+					
				Sustain productive fish and wildlife habitats in Terrebonne Shoreline.	F				+	+	+	+	+	+	+		+	+											+		+					
				Eliminate removal of sediments on the Barrier Islands.	C																+															
	EU3a-7 Penchant East	Function disruption due to subsidence, freshwater/sediment disruption, and salt water intrusion.	Loss of fresh/intermediate marsh, decrease in fisheries and shore birds, and reduction in storm attenuation.	Introduce sediment to the Penchant East area via Atchafalaya River and other sources.	C,D,G					+	+	+	+							+										+						
				Sustain productive fish and wildlife habitats in Penchant East	F				+	+	+						+			+	+															
				Reduce salt water intrusion.	E					+	+	+	+				+				+										+					
				Reduce tidal exchange Penchant of East Marshes (PEM).	E					+	+	+	+								+										+					
				Enhance hydrologic conditions of the impounded areas within PEM.	D,F,G																+										+					

* Ecosystems Unit Future Risk, percent changed: L= Low Loss (1-15); M = Moderate Loss (16-49); H = High Loss (< 5); Increase (I); Not Applicable (NA); Steady (S); Decrease (D); Increase (I); Unknown (U)
** Alternative Plan (Measure used in Alternative Plans)

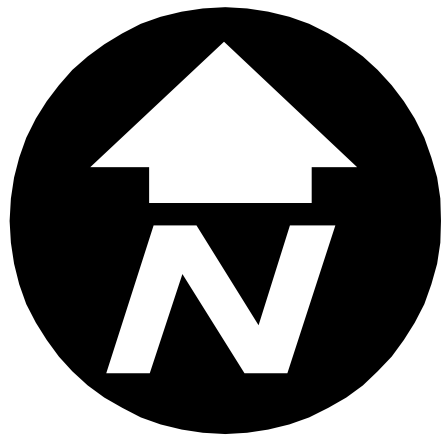
Coastwide Objectives:
A - Reduce storm damage vulnerability of coastal communities, resources, and infrastructure.
B - Minimize exposure of traditional flood protection measures to open Gulf conditions.
C - Increase sediment input from sources outside estuarine basins, and manage existing sediment resources within estuarine basines, to sustain and rejuvenate existing wetlands, rebuild marsh substrate and construct flood protections projects.
D - Maintain or establish natural landscape features and hydrologic processes that are critical to sustainable ecosystems structure and function, including dissipation of storm energy.
E - Establish or maintain dynamic salinity gradients that reflect natural cycles of freshwater availability and marine forcing (fluctuation related to normal daily and seasonal tide action or exchange).
F - Sustain productive and diverse wildlife habitats.
G - Maximize retention of river-borne sediments and nutrients within coastal wetlands.



Measures:

1. Morganza to the Gulf Hurricane Protection Levee alignment (30-ft storm surge @coastline)
2. Complete/Accelerate the Louisiana Coastal Area (LCA), Louisiana Ecosystem Restoration Study Near-Term Plan including:
 - a) Small Bayou Lafourche reintroduction
 - b) Multi-purpose operation of Houma Navigation Canal (HNC) Lock
 - c) Terrebonne Basin Barrier shoreline restoration
 - d) Maintain Land Bridge between Caillou Lake and Gulf of Mexico
 - e) Convey Atchafalaya River Water to Northern Terrebonne marshes
 - f) *Third Delta Study
 - g) *Upper Atchafalaya Basin Study
3. Pipeline conveyance of sediment to create strategic marsh platforms
4. Plugging and/or backfilling oil and gas canals to restore hydrology and regulate salt water movement
5. Bankline protection to Houma Navigation Canal (HNC)
6. Bankline protection for GIWW
7. Protection to distributed assets south of Morganza to the Gulf Hurricane Protection alignment by elevated structures and protected hurricane evacuation routes
8. *Strategize and implement plan to elevate and/or relocate assets located outside the hurricane protection plans
9. Implement Chacahoula Basin Plan and other projects to alleviate inundation issues in the Verret Sub-basin
10. Maximize beneficial use of dredge material where feasible

*Not tied to specific geographic location



0 3.5 7 10.5 Miles

1:221,760
1 inch equals 3.5 miles

Legend

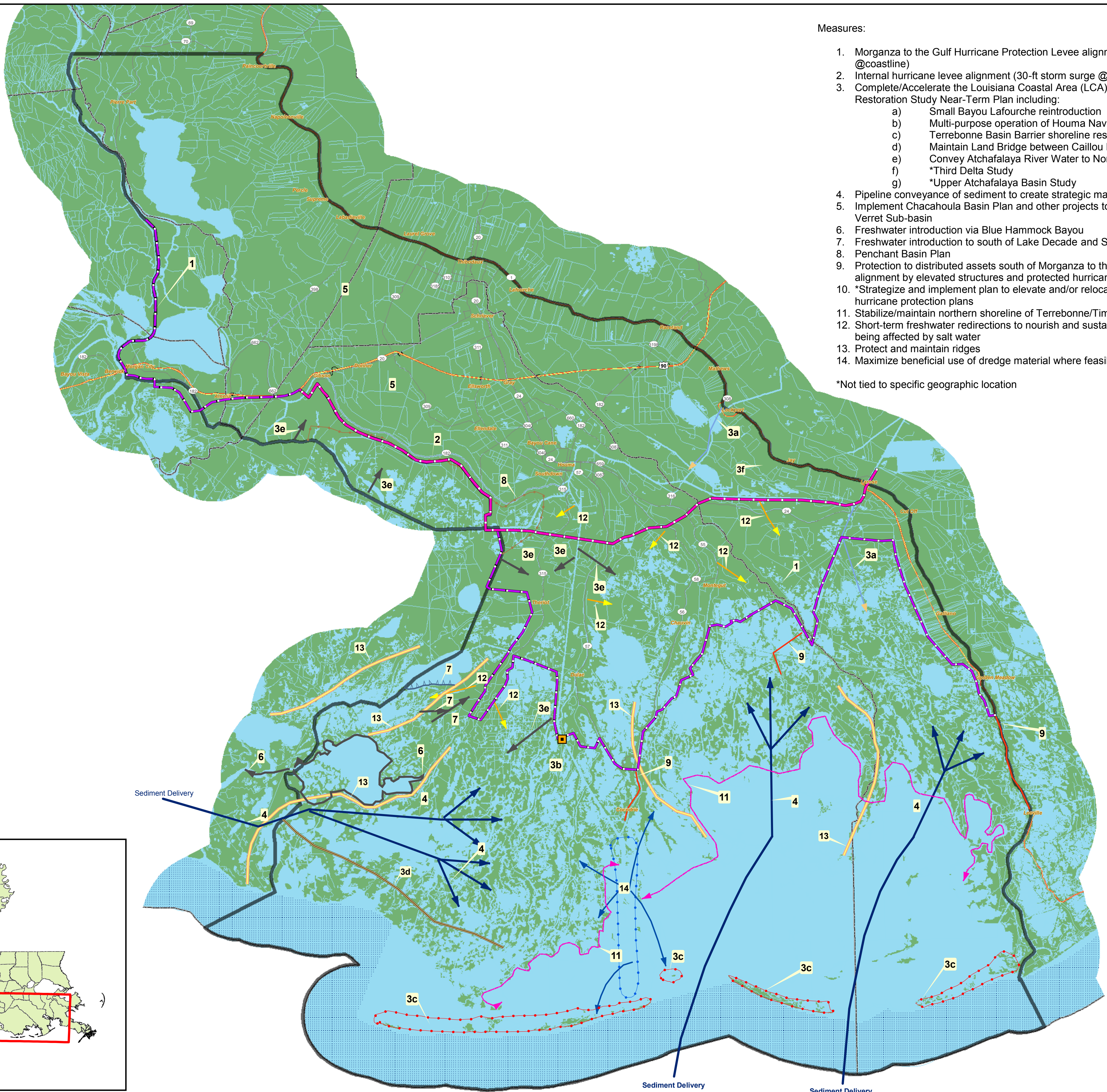
- Bankline Restoration
- Barrier Island
- Beneficial Use of Dredge Material
- Dredge Material Placement
- Freshwater Introduction
- Landbridge Restoration
- Levee Alignment
- Pipeline Conveyance of Sediment
- Protection of Distributed Assets
- River Water Re-Introduction
- Houma Navigation Canal



LOUISIANA COMPREHENSIVE COASTAL
PROTECTION MASTER PLAN

FIGURE 4.4

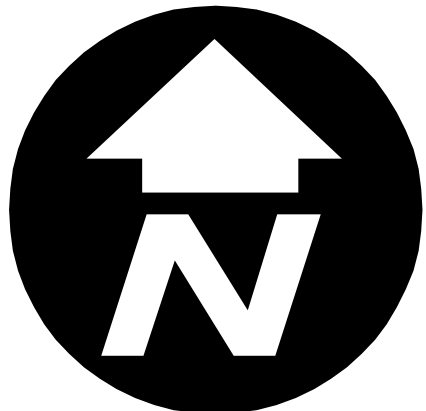
PLANNING UNIT 3A
ALTERNATIVE ONE



Measures:

1. Morganza to the Gulf Hurricane Protection Levee alignment (20-ft storm surge @coastline)
2. Internal hurricane levee alignment (30-ft storm surge @coastline)
3. Complete/Accelerate the Louisiana Coastal Area (LCA), Louisiana Ecosystem Restoration Study Near-Term Plan including:
 - a) Small Bayou Lafourche reintroduction
 - b) Multi-purpose operation of Houma Navigation Canal (HNC) Lock
 - c) Terrebonne Basin Barrier shoreline restoration
 - d) Maintain Land Bridge between Caillou Lake and Gulf of Mexico
 - e) Convey Atchafalaya River Water to Northern Terrebonne marshes
 - f) *Third Delta Study
 - g) *Upper Atchafalaya Basin Study
4. Pipeline conveyance of sediment to create strategic marsh platforms
5. Implement Chachoula Basin Plan and other projects to alleviate inundation issues in the Verret Sub-basin
6. Freshwater introduction via Blue Hammock Bayou
7. Freshwater introduction to south of Lake Decade and Shoreline Protection
8. Penchant Basin Plan
9. Protection to distributed assets south of Morganza to the Gulf Hurricane Protection alignment by elevated structures and protected hurricane evacuation routes
10. *Strategize and implement plan to elevate and/or relocate assets located outside the hurricane protection plans
11. Stabilize/maintain northern shoreline of Terrebonne/Timbalier Bay
12. Short-term freshwater redirections to nourish and sustain intermediate marshes that are being affected by salt water
13. Protect and maintain ridges
14. Maximize beneficial use of dredge material where feasible

*Not tied to specific geographic location



0 3.5 7 10.5 Miles

1:221,760

1 inch equals 3.5 miles

Legend

- Bankline Stabilization
- Barrier Island
- Beneficial Use of Dredge Material
- Dredge Material Placement
- Freshwater Introduction
- Internal Levee Alignment
- Landbridge Restoration
- Levee Alignment
- Penchant Basin Plan
- Pipeline Conveyance of Sediment
- Protect and Maintain Ridges
- Protection of Distributed Assets
- River Water Re-Introduction
- Shoreline Protection
- Short Term Freshwater Diversion
- Houma Navigation Canal

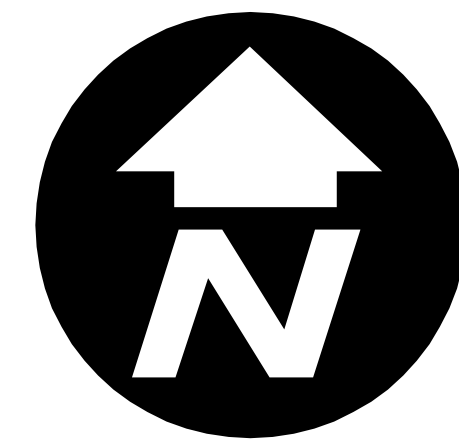


LOUISIANA COMPREHENSIVE COASTAL PROTECTION MASTER PLAN

FIGURE 4.5

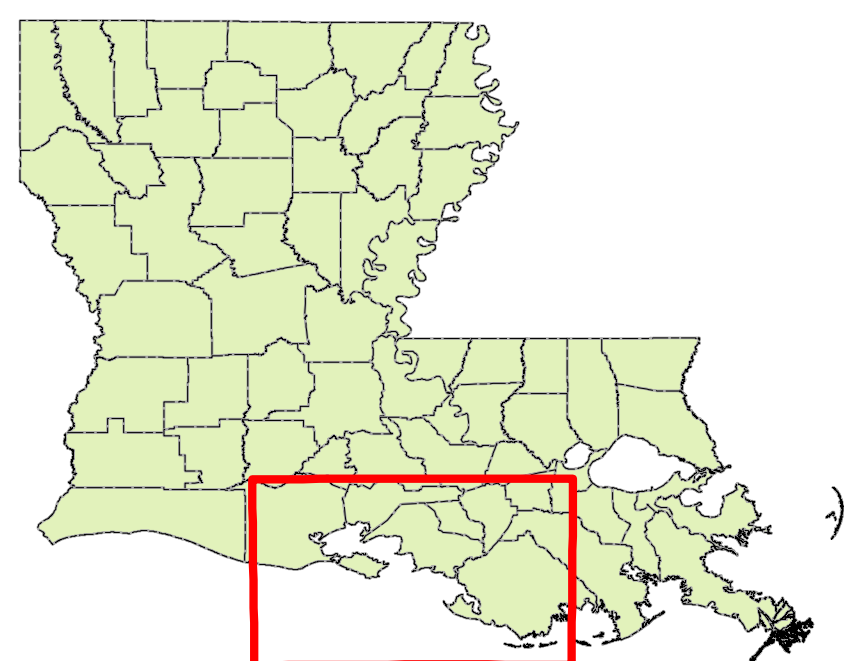
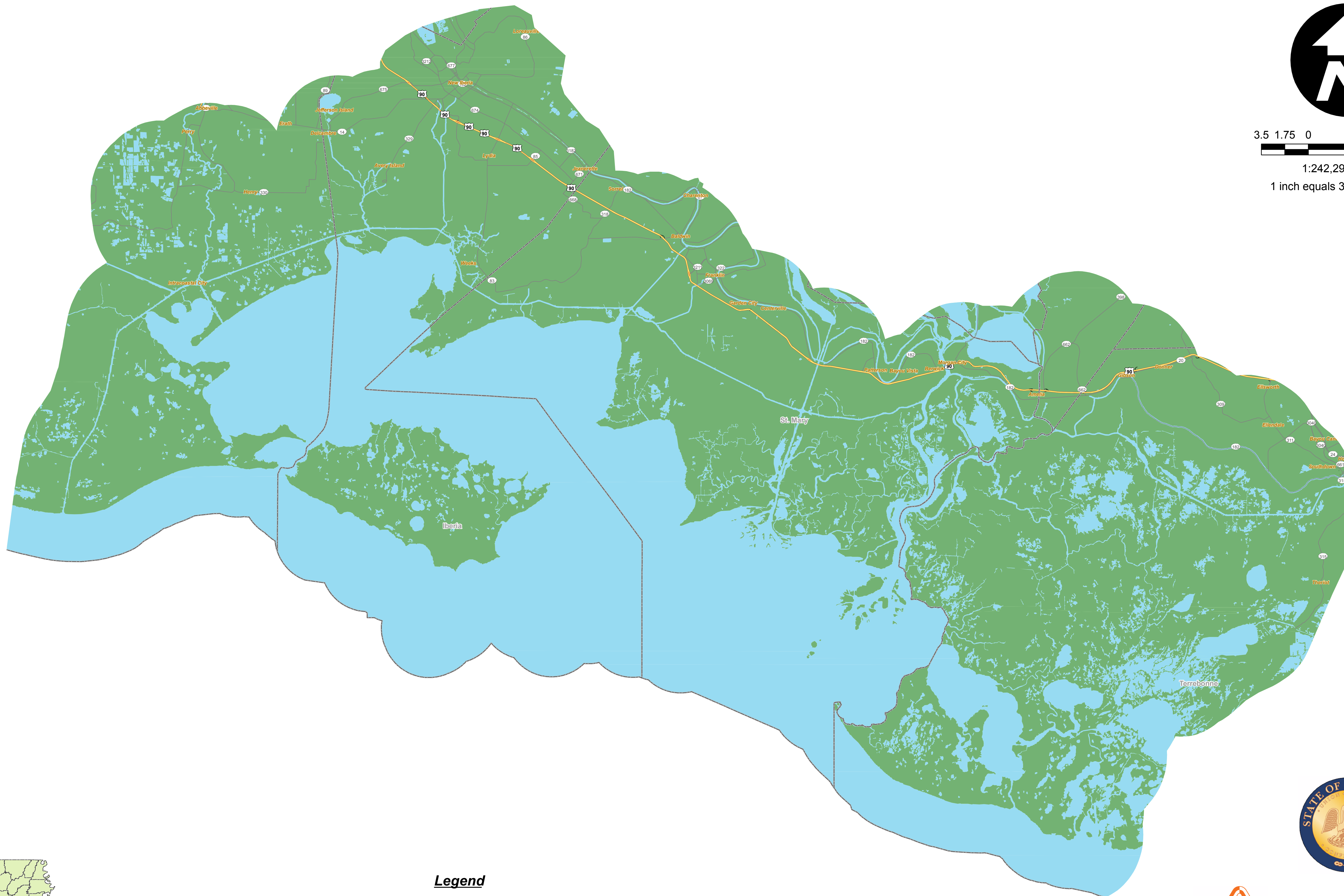
PLANNING UNIT 3A
ALTERNATIVE TWO





1:242,290.165098

1 inch equals 3.824024 miles



Legend

- | | | | |
|--|-----------------|--|-----------------|
| | Land | | Limited Access |
| | Water | | Highways |
| | Parish Boundary | | Secondary Roads |
| | | | Other |
| | | | Highway Ramp |

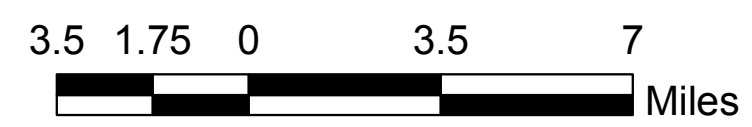
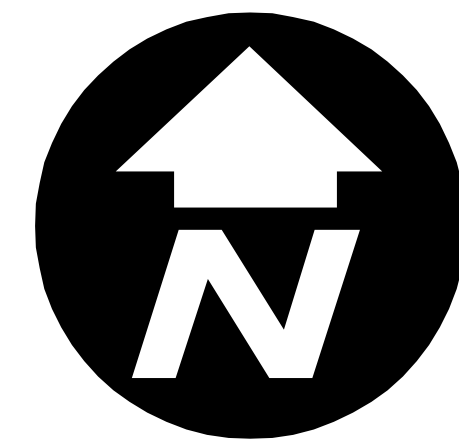


LOUISIANA COMPREHENSIVE COASTAL
PROTECTION MASTER PLAN

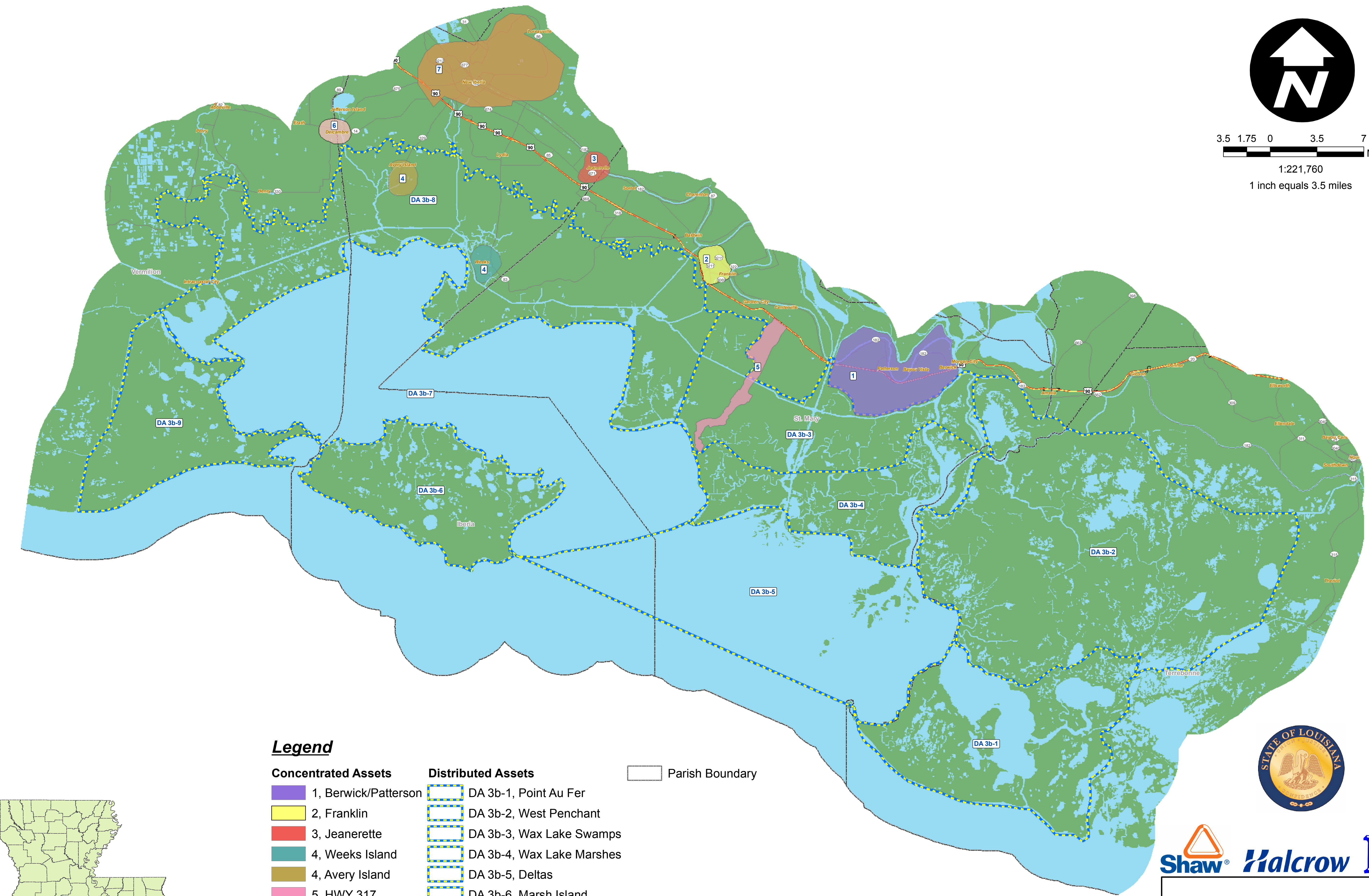
FIGURE 5.1

PLANNING UNIT 3b
BOUNDARY AND BASE MAP

Coordinate system: Louisiana South State Plane feet, NAD83, FIPS Zone 1702



1:221,760
1 inch equals 3.5 miles



Legend

Concentrated Assets

- 1, Berwick/Patterson
- 2, Franklin
- 3, Jeanerette
- 4, Weeks Island
- 4, Avery Island
- 5, HWY 317
- 6, Delcambre
- 7, New Iberia

Distributed Assets

- DA 3b-1, Point Au Fer
- DA 3b-2, West Penchant
- DA 3b-3, Wax Lake Swamps
- DA 3b-4, Wax Lake Marshes
- DA 3b-5, Deltas
- DA 3b-6, Marsh Island
- DA 3b-7, Acadiana Bays
- DA 3b-8, Acadiana Wetlands
- DA 3b-9, Raynie Marsh

Parish Boundary



LOUISIANA COMPREHENSIVE COASTAL
PROTECTION MASTER PLAN

FIGURE 5.2
PLANNING UNIT 3b
CONCENTRATED ASSETS AND
DISTRIBUTED ASSETS

Coordinate system: Louisiana South State Plane feet, NAD83, FIPS Zone 1702

PLANNING UNIT 3b: Bayou de West / Bay Junop to Freshwater Bayou

Table 5.1 Relative Damages from Storm Surge to Concentrated Assets

Proportion of assets damaged or destroyed due to storm surge: EL = Extremely Low (0-5%) L = Low (5 - 15%) M = Medium (15 - 25%) H = High (25 - 50%) EH = Extremely High (>50%)	Storm Surge at Coastline (Feet)	Berwick Patterson	Franklin	Jeanerette	Avery / Weeks Island	Intercoastal City	Delcambre	Abbeville	New Iberia
	5	EL	EL	EL	EL	EL	L	EL	EL
	10	EL	EL	L	EL	M	M	L	EL
	15	EL	M	M	M	H	H	M	L
	20	H	M	H	H	EH	EH	H	M
	25	EH	EH	EH	H	EH	EH	EH	H
	30	EH	EH	EH	EH	EH	EH	EH	EH

Table 5.2 Concentrated Assets Scoring

Scoring Criteria	Storm Surge at Coastline (Feet)	Berwick Patterson	Franklin	Jeanerette	Avery / Weeks Island	Intercoastal City	Delcambre	Abbeville	New Iberia
1. Residences	25	12	12	8	3	2	5	10	12
2. Industry	20	10	10	8	8	9	8	10	12
3. Infrastructure	15	10	8	6	8	5	5	8	10
4. Institutional & Publicly Owned Facilities	20	9	11	7	1	5	4	10	11
5. Strategic Resources	20	10	8	4	1	5	4	7	8
Total Score	100	51	49	33	21	26	26	45	53

Table 5.3 Relative Damages from Storm Surge to Distributed Assets¹

Proportion of assets damaged or destroyed due to storm surge: EL = Extremely Low (0-5%) L = Low (5 - 15%) M = Medium (15 - 25%) H = High (25 - 50%) EH = Extremely High (>50%)	Storm Surge at Coastline (Feet)	DA-1 Point Au Fer	DA-2 West Penchant	DA-3 Wax Lake Swamps	DA-4 Wax Lake Marshes	DA-5 Deltas	DA-6 Marsh Island	DA-7 Acadiana Bays	DA-8 Acadiana Wetlands	DA-9 Raynie Marsh
	5	EL	EL	EL	EL	EL	EL	EL	EL	L
	10	L	L	EL	EL	L	M	L	M	M
	15	M	M	L	M	M	H	H	H	H
	20	H	H	L	H	H	EH	EH	EH	EH
	25	EH	EH	H	EH	EH	EH	EH	EH	EH
	30	EH	EH	EH	EH	EH	EH	EH	EH	EH

¹ Assets outside of the defined concentrated areas (see Concentrated and Distributed Assets Map)

Table 5.4 Scoring of Distributed Assets

Scoring Criteria	Maximum Score for Resources	DA-1 Point Au Fer	DA-2 West Penchant	DA-3 Wax Lake Swamps	DA-4 Wax Lake Marshes	DA-5 Deltas	DA-6 Marsh Island	DA-7 Acadiana Bays	DA-8 Acadiana Wetlands	DA-9 Raynie Marsh
National Significance	25	10	20	25	20	15	10	15	25	20
State Significance	25	15	15	20	15	15	15	15	20	15
Local Significance	25	25	15	20	15	20	25	20	20	15
Critical to Recovery	25	5	5	25	5	10	5	5	25	5
Total Score	100	55	55	90	55	60	55	55	90	55

TABLE 5.5 DISTRIBUTED ASSETS FOR PLANNING UNIT 3b

The land outside the defined communities was divided into areas of surge impact commonality. For Planning Unit 2 these are defined by the significant water bodies that impact these areas:

Point Au Fer	= DA 3b-1
West Penchant	= DA 3b-2
Wax Lake Swamp	= DA 3b-3
Wax Lake Marshes	= DA 3b-4
Deltas	= DA 3b-5
Marsh Island	= DA 3b-6
Acadiana Bays	= DA 3b-7
Acadiana Wetlands	= DA 3b-8
Raynie Marsh	= DA 3b-9

Within these areas following assets are comprised:

	Assets	Oil & Gas	Pipelines	Highway, Bridges & Transportation	Evacuation Routes	Ports, Waterway & Infrastructure	Other Strategic Assets
DA 3b-1	Oil & Gas Wells	X					
	Oil & Gas Pipelines		X				
DA 3b-2	Oil & Gas Wells	X					
	Oil & Gas Pipelines		X				
	GIWW					X	
	Bayou's Bouef, Black & Chene					X	
	Transco/Williams Facility						X
DA 3b-3	Oil & Gas Facilities	X					
	Oil & Gas Pipelines		X				
	Hwy 90 (future I-49)			X	X		
	Hwy 182			X			
	Atchafalaya Bridges (2)			X			
	Wax Lake Outlet					X	
DA 3b-4	Oil & Gas Facilities	X					
	Oil & Gas Pipelines		X				
	Wax Lake Outlet					X	
	Atchafalaya River					X	
DA 3b-5	Oil & Gas Facilities	X					
	Oil & Gas Pipelines		X				
	Atchafalaya River					X	
	Wax Lake Outlet					X	
-6	Oil & Gas Facilities	X					

	Assets	Oil & Gas	Pipelines	Highway, Bridges & Transportation	Evacuation Routes	Ports, Waterway & Infrastructure	Other Strategic Assets
DA 3b-6	Oil & Gas Pipelines		X				
	Hunting and Fishing Sites						X
	Southwest Pass					X	
DA 3b-7	Oil & Gas Facilities	X					
	Oil & Gas Pipelines		X				
	Acadiana Navigation Canal					X	
	Vermillion River Cut-off					X	
DA 3b-8	Oil & Gas Facilities	X					
	Oil & Gas Pipelines		X				
	Port of West St. Mary					X	
	Port of Iberia					X	
	Port of Delcambre					X	
	Freshwater Bayou					X	
	U.S. Highway 90				X		
DA 3b-9	Oil & Gas Facilities	X					
	Oil & Gas Pipelines		X				
	Freshwater Bayou					X	
	Freshwater Bayou Lock					X	
	Southwest Pass					X	

Table 5.6. Planning Unit 3B Existing Conditions/ Problem Identification

NOTE: Rankings are only relatable within an ecosystem unit; the purpose is not to prioritize between units, but rather to prioritize function disruptions within ecosystem units

Function Disruption (System Threat)	Ecosystem Unit								
	EU 3b-1	EU 3b-2	EU 3b-3	EU 3b-4	EU 3b-5	EU 3b-6	EU 3b-7	EU 3b-8	EU 3b-9
	Point Au Fer	West Penchant	Wax Lake Swamps	Wax Lake Marshes	Deltas	Marsh Island	Acadiana Bays	Acadiana Wetlands	Raynie Marsh
Subsidence	M	M	M	M	M	M	M	M	M
Tidal Exchange	L	NI	NI	NI	NI	L	L	NI	L
Sediment Disruptions	NI	H	NI	NI	NI	NI	M	L	L
Salt Water Intrusion	NI	NI	NI	NI	NI	NI	NI	NI	NI
Altered Inundation	NI	H	L*	L	L	NI	NA	L	M
Wave/Wake Energy	M	H	L	L	L	M	H	H	M
Direct Removal	M	H	M	L	NI	M	NA	M	L

No Impact

NI

Low

L

Moderate

M

High

H

Very High

VH

Subsidence = true subsidence; benchmark elevations not referenced to tide gauges

Tidal Exchange = Daily tide energy; assumed to be more destructive to historically fresh/intermediate wetlands, more beneficial to brackish/saline wetlands; assumed that if fresh to fresh then not exposed to tidal scour.

Sediment Disruptions = disconnection from riverine sources

Saltwater Intrusion = due to encroachment of Gulf on landscape edge or movement up canals & channels

Altered Inundation = altered frequency or duration of inundation, not related to RSLR; e.g., impoundments

Wave/Wake Energy = includes storm energy

Direct Removal = dredging sediments or covering by spoil banks & levees.

* Avoca Island in this sub unit

Table 5.7. Planning Unit 3B Changes in Natural Resources, 1990 - 2050 (From Coast 2050 Report; LCA Land Change Map)

Resource	Ecosystem Unit								
	EU 3b-1	EU 3b-2	EU 3b-3	EU 3b-4	EU 3b-5	EU 3b-6	EU 3b-7	EU 3b-8	EU 3b-9
	Point Au Fer	West Penchant	Wax Lake Swamps	Wax Lake Marshes	Deltas	Marsh Island	Acadiana Bays	Acadiana Wetlands	Raynie Marsh
Swamp	NA	NA	NA	NA	NA	NA	NA	NI	NA
Fresh/Intermediate Marsh	NA	M	M	M	I	NA	NA	M	I
Brackish/Saline Marsh	M	NA	NA	NA	NA	L	L	L	L
Beach/Dune/Back Barrier Marsh	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sessile Estuarine (Oysters)	S	NI	NI	NI	U	NI	NI	D	NI
Saltwater (Red Drum)	S	S	NI	NI	U	S	S	S	S
Freshwater (Largemouth Bass)	I	I	I	I	U	NI	NI	I	I
Estuarine (Spotted Seatrout)	D	D	NI	NI	U	D	D	D	NI
Estuarine (Shrimp)	S	S	NI	NI	U	S	S	S	S
Woodland Edge (Deer)	S	S	S	S	NI	NI	NI	S	S
Woodland Avifauna	NI	S	NI	NI	NI	NI	NI	D	NI
Fresh Wetlands (Alligator)	D	I	I	I	I	I	NI	I	I
Muskrat	S	S	S	S	S	S	NI	S	S
Shore Birds	D	NI	S	S	S	D	NI	S	D
Loss of Storm Attenuation***	M	M	M	L	NI	L	L	L	L

Wetland Key

No Impact	NI
Low Loss	L
Moderate Loss	M
High Loss	H
Increase	I
Not Applicable	NA

% Change

0
1-15
16-49
>50

Fish & Wildlife Key

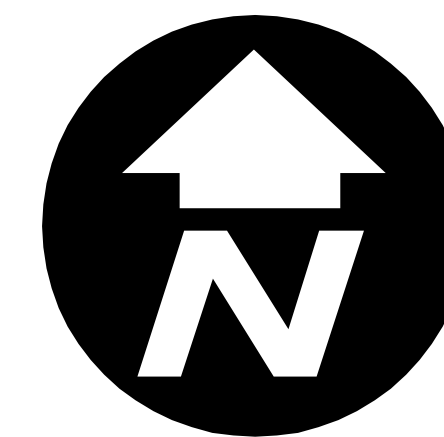
No Impact/Not historically present	NI
Steady	S
Decrease	D
Increase	I
Unknown (No information)	U

NOTES:

* = Small acreage by percentage w/in ecosys unit

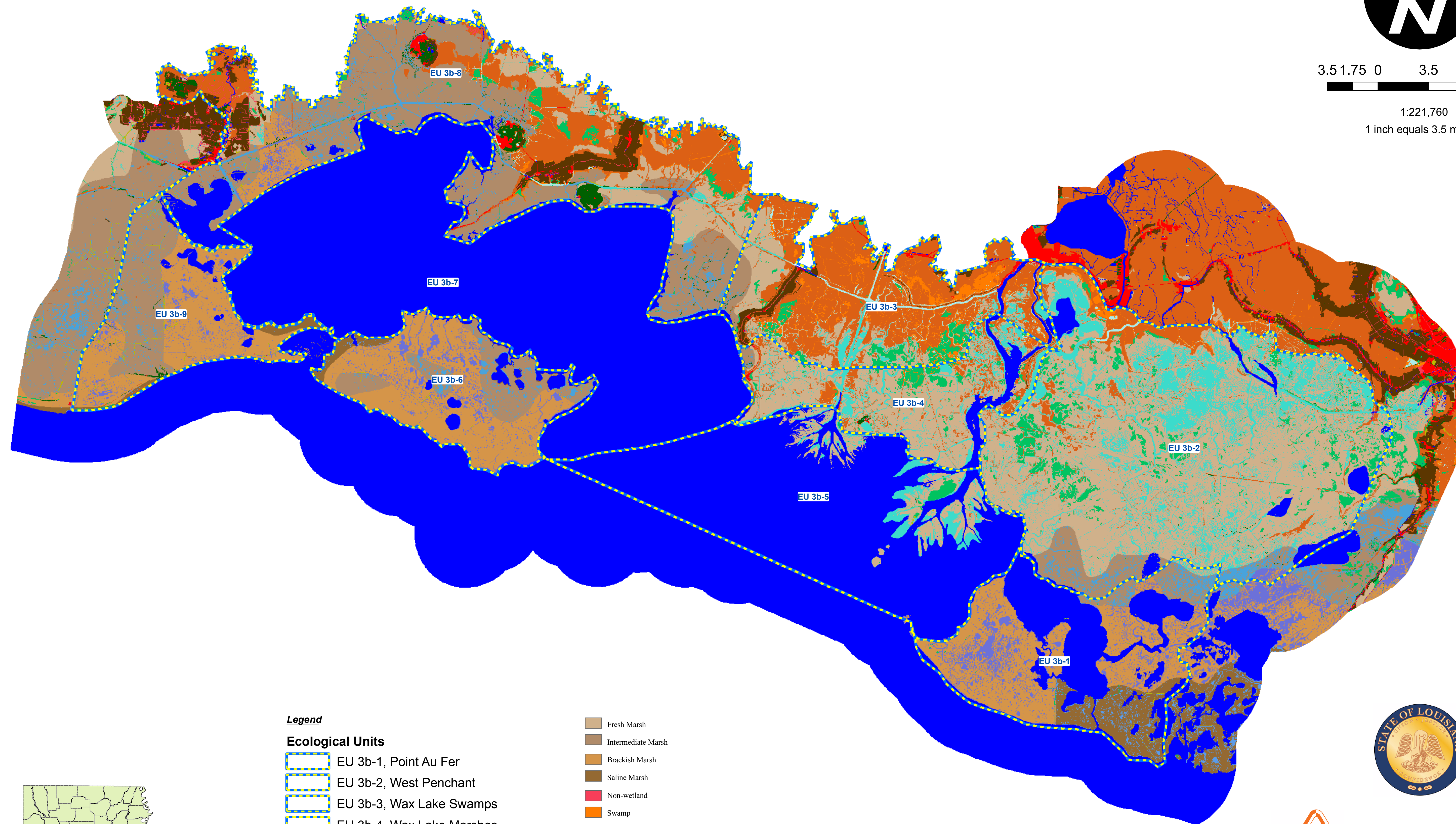
** = Lake Pontchartrain Atlas

*** = Using land change as the surrogate for changes in storm attenuation capacity



3.5 1.75 0 3.5 7 Miles

1:221,760
1 inch equals 3.5 miles



Legend

Ecological Units

- EU 3b-1, Point Au Fer
- EU 3b-2, West Penchant
- EU 3b-3, Wax Lake Swamps
- EU 3b-4, Wax Lake Marshes
- EU 3b-5, Deltas
- EU 3b-6, Marsh Island
- EU 3b-7, Acadiana Bays
- EU 3b-8, Acadiana Wetlands
- EU 3b-9, Raynie Marsh

- Fresh Marsh
- Intermediate Marsh
- Brackish Marsh
- Saline Marsh
- Non-wetland
- Swamp
- Wetland Forest
- Wetland Shrub/Scrub
- Upland Shrub/Scrub
- Ag/Pasture
- Developed
- Barren
- Water



LOUISIANA COMPREHENSIVE COASTAL
PROTECTION MASTER PLAN

FIGURE 5.3

**PLANNING UNIT 3b
ECOSYSTEM UNITS/NATURAL RESOURCES**



Table 5.8b Planning Unit 3b: Objectives and Measures Table - Distributed Assets

	Geographic Location	Current Issues	Future Risk/Impact	Planning Unit Objective	Coastal Objectives	Measures																													
						1	2a	2b	2c	2d	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	
						Hurricane Protection Levee	Stabilize Gulf Shoreline of Point Au Fer Island	Convey Atchafalaya River water to NorthernTerrebone Marshes	Acadiana bays estuarine restoration feasibility study	Upper Achafalaya Basin Study	Create Marsh at Weeks Bay	Create Marshes at Marsh Island	Restore Vermillion Bay and East & West Cote Bays shorelines	Increase Sediment Transport Down Wax Lake Outlet	Maintain Northern Shore of East Cote Branche Bay at Point Marone	Rebuild Historic Reefs at Point Au Fer	Stabilize banks of Southwest Pass off Marsh Island and Rainey Marsh	Acadiana Bay Estuarine Restoration for Old Shell Ridge	Maintain Vermillion East and West Cote Blanche Bays as Brackish	Optimize GWW Flow to Marshes and Eliminate GWW Direct Flows into	Resolve Cote Blanche Bays Salinity and Turbidity Issues	Create an Artificial Reef Complex from Point Chevreuil Southward	Storm Surge Protection - Levee Alignment South of GWW	Storm Surge Protection - Levee Alignment North of GWW	Point Chevreuil Shoreline Protection Project	Vermillion Bay Shoreline Beach Restoration/Vegetative Plant & Maintenance	Beneficial Uses of Dredged Material/Dedicated Dredging/Avoca Lake	Beneficial Uses of Dredged Material/Dedicated Dredging/shorelines	Maximize sediment use from Atchafalaya River	Stabilize shoreline - Freshwater Bayou to Southwest Pass	Stabilize shorelines-Point Au Fer to Pelican Island	Stabilize shorelines-Lighthouse Point to South Point/Marsh Island	Stabilize shorelines-Freshwater Bayou and GWW	Freshwater Bayou Bank Stialization	
Alt. 1** Alt. 2**	Alt. 1 Alt. 2	Alt. 1 Alt. 2	Alt. 1 Alt. 2	Alt. 1 Alt. 2	Alt. 1 Alt. 2	Alt. 1 Alt. 2	Alt. 2	Alt. 1	Alt. 1 Alt. 2	Alt. 1 Alt. 2	Alt. 2	Alt. 1	Alt. 1	Alt. 1 Alt. 2	Alt. 1 Alt. 2	Alt. 1	Alt. 1	Alt. 2	Alt. 1	Alt. 1 Alt. 2	Alt. 1	Alt. 1 Alt. 2	Alt. 2	Alt. 2	Alt. 1 Alt. 2	Alt. 2	Alt. 2	Alt. 2	Alt. 1 Alt. 2	Alt. 2	Alt. 2	Alt. 1 Alt. 2			
Distributed Assets	DA3b-1 Point Au Fer	Extremely high level of damage to Distributed Assets with storm surges over 25 ft.	Increased risk to assets due to sea level rise and wetland loss.	Provide coastal protection to oil and gas fields and pipelines.	A, B, C, D		+								+										+			+							
	DA3b-2 West Penchant	Extremely high level of flood risk to Distributed Assets with storm surges over 25 ft.	Increased flood risk to assets due to sea level rise and wetland loss.	Provide coastal protection to GWW, Bayou's Buoeif, Black & Chene.	A.B. C. D	+	+								+					+	+					+			+						
				Provide coastal protection to oil and gas fields and pipelines.	A.B. C. D	+	+											+				+	+					+			+				
	DA3b-3 Wax Lake Swamps	Extremely high level of flood risk to Distributed Assets with storm surges over 30 ft.	Increased flood risk to assets due to sea level rise and wetland loss.	Provide coastal protection to oil and gas fields and pipelines.	A.B. C. D	+	+						+		+					+						+			+						
				Provide coastal protection to Wax Lake Swamp.	A, B, C, D, E, F, G		+							+		+									+		+			+					
				Provide coastal protection to Highways, bridges, and Evacuation Routes.	A.B. C. D	+	+				+		+									+	+			+		+		+					
	DA3b-4 WaX Lake Marshes	Extremely high level of damage to Distributed Assets with storm surges over 25 ft.	Increased flood risk to assets due to sea level rise and wetland loss.	Provide coastal protection to oil and gas fields and pipelines.	A.B. C. D	+	+						+		+					+	+			+		+		+							
				Provide coastal protection to Wax Lake Outlet and Atchafalaya River.	A.B. C. D	+	+							+		+						+	+				+	+		+					
	DA3b-5 Deltas	Extremely high level of damage to Distributed Assets with storm surges over 25 ft.	Loss of Distributed Assets due to permanent erosion/flooding.	Provide coastal protection to oil and gas fields and pipelines.	A.B. C. D	+					+		+					+		+	+	+		+		+			+		+				
				Provide coastal protection to Wax Lake Outlet and Atchafalaya River.	A.B. C. D	+	+							+		+						+	+				+	+		+					
	DA3b-6 Marsh Island	Extremely high level of damage to Distributed Assets with storm surges over 20 ft.	Loss of Distributed Assets due to permanent erosion/flooding.	Provide coastal protection to oil and gas facilities and pipelines.	A,B,C,D,G				+			+	+	+			+	+					+			+		+	+		+				
				Maintain Southwest Pass.	A.B. C. D				+			+				+									+		+	+	+		+				
	DA3b-7 Acadiana Bays	Extremely high level of damage to Distributed Assets with storm surges over 20 ft.	Loss of Distributed Assets due to permanent erosion/flooding.	Provide coastal protection to oil and gas facilities and pipelines.	A.B. C. D				+		+	+	+	+			+	+							+		+	+			+	+			
				Maintain the Acadiana Navigation Canal and Vermillion River Cutoff.	A.B. C. D	+			+				+					+	+			+	+			+		+			+	+			
	DA3b-8 Acadiana Wetlands	Extremely high level of damage to Distributed Assets with storm surges over 20 ft.	Loss of Distributed Assets due to permanent erosion/flooding.	Provide coastal protection to oil and gas facilities and pipelines.	A.B. C. D				+		+	+	+	+			+	+						+		+	+			+	+				
				Provide coastal protection to evacuation route.	A, B, C, D, E, F, G	+			+		+		+	+				+							+		+				+	+			
				Provide coastal protection to Freshwater Bayou and Ports of West St. Mary, Iberia, and Delcambre.	A.B. C. D	+			+		+	+	+	+			+					+	+			+		+			+	+	+		
	DA3b-9 Rainey Marsh	Extremely high level of damage to Distributed Assets with storm surges over 20 ft.	Loss of Distributed Assets due to permanent erosion/flooding.	Provide coastal protection to oil and gas facilities and pipelines.	A, B, C, D, E, F, G				+		+	+	+	+			+						+		+		+		+	+	+				
				Maintatin Freshwater Bayou, Freshwater Bayou Lock and Southwest Pass.	A,B,C,D,G				+		+	+	+				+								+		+		+		+	+	+		

* Current issues, percent flooded: H = High (25-50%); EH= Extremely High (> 50%)
** Alternative Plan (Measure used in Alternative Plans)

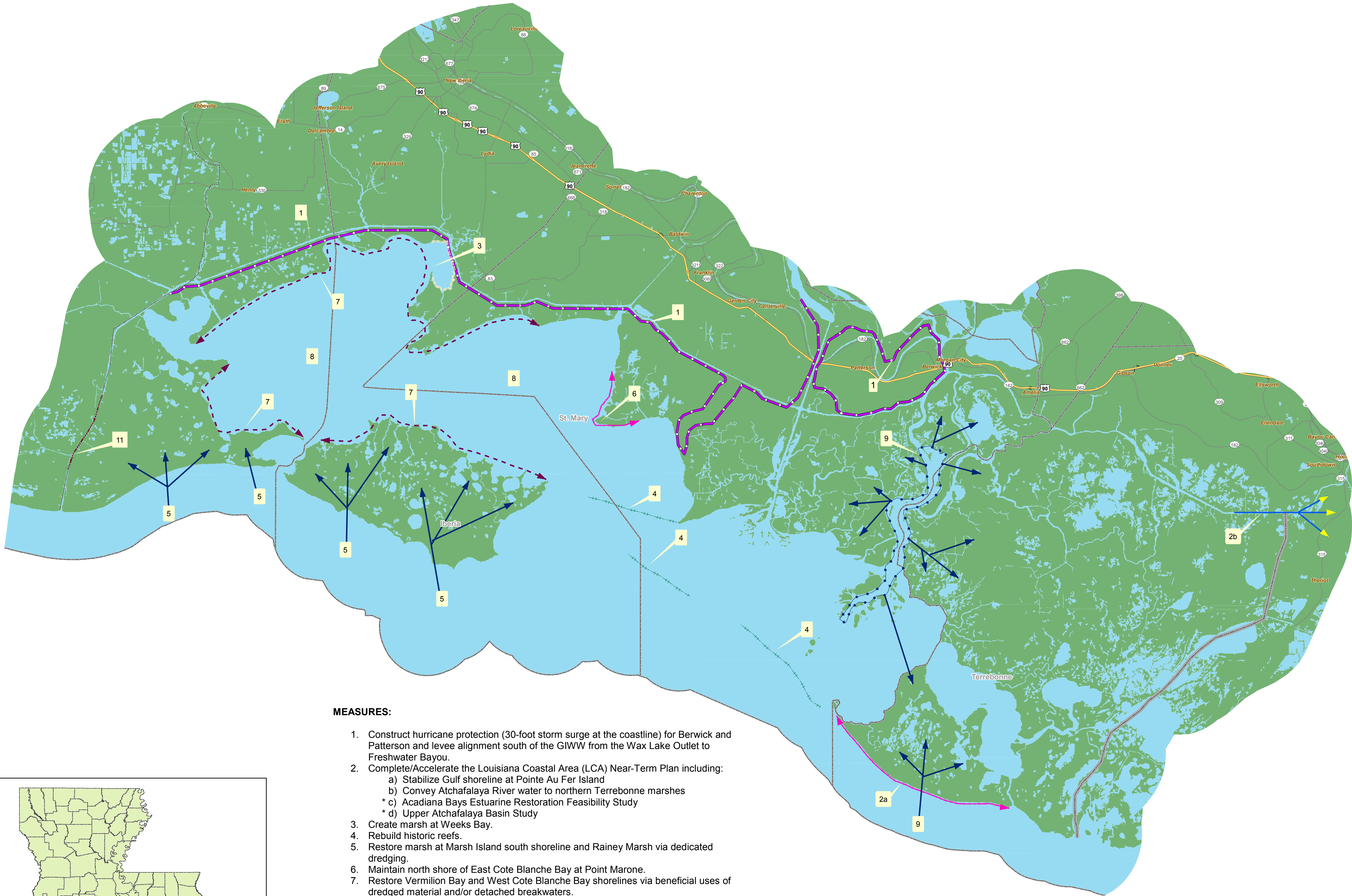
Coastwide Objectives:
A - Reduce storm damage vulnerability of coastal communities, resources, and infrastructure.
B - Minimize exposure of traditional flood protection measures to open Gulf conditions.
C - Increase sediment input from sources outside estuarine basins, and manage existing sediment resources within estuarine basines, to sustain and rejuvenate existing wetlands, rebuild marsh substrate and construct flood protections projects.
D - Maintain or establish natural landscape features and hydrologic processes that are critical to sustainable ecosystems structure and function, including dissipation of storm energy.
E - Establish or maintain dynamic salinity gradients that reflect natural cycles of freshwater availability and marine forcing (fluctuation related to normal daily and seasonal tide action or exchange).
F - Sustain productive and diverse wildlife habitats.
G - Maximize retention of river-borne sediments and nutrients within coastal wetlands.

Table 5.8c Planning Unit 3b: Objectives and Measures Table - Ecosystem Units

	Geographic Location	Current Issues	Future Risk/Impact*	Planning Unit Objective	Coastal Objectives	Measures																													
						1	2a	2b	2c	2d	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	
						Hurricane Protection	Stabilize Gulf Shoreline of Point Au Fer Island	Convey Atchafalaya River water to Northern Terrebonne Marshes	Acadiana bays estuarine restoration feasibility study	Upper Atchafalaya Basin Study	Create Marsh at Weeks Bay	Create Marshes at Marsh Island	Restore Vermillion Bay and East & West Cote Bays shorelines	Increase Sediment Transport Down Wax Lake Outlet	Maintain Northern Shore of East Cote Branche Bay at Point Marone	Rebuild Historic Reefs at Point Au Fer	Stabilize banks of Southwest Pass off Marsh Island and Rainey Marsh	Acadiana Bay Estuarine Restoration for Old Shell Ridge	Maintain Vermillion East and West Cote Blanche Bays as Brackish	Optimize GIWW Flow to Marshes and Eliminate GIWW Direct Flows into	Resolve Cote Blanche Bays Salinity and Turbidity Issues	Create an Artificial Reef Complex from Point Chevreuil Southward	Storm Surge Protection - Levee Alignment South of GIWW	Storm Surge Protection - Levee Alignment North of GIWW	Point Chevreuil Shoreline Protection Project	Vermillion Bay Shoreline Beach Restoration/Vegetative Plant & Maintenance	Beneficial Uses of Dredged Material/Dedicated Dredging/Avoca Lake	Beneficial Uses of Dredged Material/Dedicated Dredging/shorelines	Maximize sediment use from Atchafalaya River	Stabilize shoreline - Freshwater Bayou to Southwest Pass	Stabilize shorelines-Point Au Fer to Pelican Island	Stabilize shorelines-Lighthouse Point to South Point/Marsh Island	Stabilize shorelines-Freshwater Bayou and GIWW	Freshwater Bayou Bank Stabilization	
						Alt. 1** Alt. 2**	Alt. 1 Alt. 2	Alt. 1 Alt. 2	Alt. 1 Alt. 2	Alt. 1 Alt. 2	Alt. 1 Alt. 2	Alt. 1 Alt. 2	Alt. 2	Alt. 1	Alt. 1 Alt. 2	Alt. 1 Alt. 2	Alt. 2	Alt. 1	Alt. 1	Alt. 1 Alt. 2	Alt. 1 Alt. 2	Alt. 1	Alt. 1	Alt. 2	Alt. 1	Alt. 1 Alt. 2	Alt. 1	Alt. 1 Alt. 2	Alt. 2	Alt. 2	Alt. 1 Alt. 2	Alt. 2	Alt. 2	Alt. 1 Alt. 2	Alt. 2
Ecosystem Units	EU3b-1 Point Au Fer	Function disruption due to subsidence, wave/wake energy and direct removal.	Moderate loss of brackish/saline marsh, decreased fisheries and wildlife, and reduction in storm attenuation.	Introduce Atchafalaya River sediments into the Point Au Fer Island area (PAF).	A, B, C, D, E, F, G		+	+									+									+	+		+						
				Reduce wave/wake energy impacts to the PAF.	A, B, C, D, E, F, G		+	+									+												+	+		+			
				Reduce direct removal of sediment from the PAF.	A, B, C, D, E, F, G		+	+									+												+	+		+			
				Sustain productive fish and wildlife habitats.	A, B, C, D, E, F, G		+										+												+	+		+			
	EU3b-2 West Penchant	Function disruption due to subsidence, freshwater/sediment disruption, wave/wake energy, altered inundation, and direct removal.	Moderate loss of fresh/intermediate marsh, decreased fisheries, and reduction in storm attenuation.	Increase introduction of Atchafalaya River sediments into the West Penchant area (WP).	A, B, C, D, E, F, G			+		+															+		+								
				Reduce wave/wake energy impacts to the WP.	A, B, C, D, E, F, G		+			+						+															+				
				Restore hydrology within WP.	A, B, C, D, E, F, G			+											+				+									+			
	EU3b-3 Wax Lake Swamps	Function disruption due to direct removal and subsidence.	Moderate loss of fresh/intermediate marsh and reduction in storm attenuation.	Reduce direct removal of sediment from the Wax Lake Swamps.	A, B, C, D, E, F, G			+		+				+				+				+				+	+								
	EU3b-4 Wax Lake Marshes	Function disruption due to subsidence.	Moderate loss of fresh/intermediate marsh.	Encourage natural delta building processes.	A, B, C, D, E, F, G			+		+				+													+								
	EU3b-5 Delta	Function disruption due to subsidence.	Ongoing delta building.	Encourage natural delta building processes.	A, B, C, D, E, F, G			+		+				+													+								
	EU3b-6 Marsh Island	Function disruption due to subsidence, wave/wake energy and direct removal.	Decrease in fisheries and shore birds.	Sustain productive fish and wildlife habitats in Marsh Island.	A, B, C, D, E, F, G						+	+			+			+					+		+		+		+	+					
				Reduce wave/wake energy impacts to Marsh Island.	A, B, C, D, E, F, G						+	+				+								+		+		+		+	+				
				Introduce Atchafalaya River sediments into the Marsh Island area.	A, B, C, D, E, F, G						+	+	+														+								
				Reduce direct removal on Marsh Island.	A, B, C, D, E, F, G				+		+	+	+			+							+		+	+	+		+	+		+	+		
	EU3b-7 Acadiana Bays	Function disruption due to subsidence, wave/wake energy and freshwater/sediment disruption.	Loss of saline/brackish marsh, decrease in fisheries and reduced storm attenuation.	Sustain productive fish and wildlife habitats in Acadiana Bays.	A, B, C, D, E, F, G				+	+	+	+	+			+						+		+		+		+		+	+				
				Maintain landbridge between Acadiana Bays and the GIWW.	A, B, C, D, E, F, G				+		+		+	+	+				+			+	+	+		+		+		+	+				
				Reduce/eliminate impounded areas within the PEM.	A, B, C, D, E, F, G				+				+	+					+					+		+		+		+	+		+		
				Plug outlets from GIWW into Acadiana Bays.	A, B, C, D, E, F, G				+		+	+	+									+			+		+								
	EU3b-8 Acadiana Wetlands	Function disruption due to subsidence, wave/wake energy and direct removal.	Moderate loss of marsh, decrease in fisheries, avifauna and habitats, and reduction in storm attenuation.	Maintain landbridge between Acadiana Bays and the GIWW.	A, B, C, D, E, F, G				+		+		+	+	+			+			+		+		+		+		+		+	+			
				Introduce freshwater and sediments from the Atchafalaya River into the Acadiana Wetlands (AW).	A, B, C, D, E, F, G				+	+				+														+							
				Reduce wave/wake energy impacts to AW.	A, B, C, D, E, F, G				+		+		+	+							+			+		+					+	+	+		
				Reduce direct removal of sediment from AW.	A, B, C, D, E, F, G				+		+	+	+	+										+								+	+	+	
	EU3b-9 Rainey Marsh	Function disruption due to subsidence, altered inundation, and wave/wake energy.	Conversion of brackish/saline to freshwater/intermediate marsh, decrease in shore birds.	Introduce sediments into the Rainey Marsh.	A, B, C, D, E, F, G				+		+	+	+			+							+		+	+	+		+						
				Reduce wave/wake energy impacts to Rainey Marsh.	A, B, C, D, E, F, G				+				+					+							+		+		+		+		+		+

* Ecosystems Unit Future Risk, percent changed: L= Low Loss (1-15); M = Moderate Loss (16-49); H = High Loss (< 5); Increase (I); Not Applicable (NA); Steady (S); Decrease (D); Increase (I); Unknown (U)
** Alternative Plan (Measure used in Alternative Plans)

Coastwide Objectives:
A - Reduce storm damage vulnerability of coastal communities, resources, and infrastructure.
B - Minimize exposure of traditional flood protection measures to open Gulf conditions.
C - Increase sediment input from sources outside estuarine basins, and manage existing sediment resources within estuarine basins, to sustain and rejuvenate existing wetlands, rebuild marsh substrate and construct flood protections projects.
D - Maintain or establish natural landscape features and hydrologic processes that are critical to sustainable ecosystems structure and function, including dissipation of storm energy.
E - Establish or maintain dynamic salinity gradients that reflect natural cycles of freshwater availability and marine forcing (fluctuation related to normal daily and seasonal tide action or exchange).
F - Sustain productive and diverse wildlife habitats.
G - Maximize retention of river-borne sediments and nutrients within coastal wetlands.



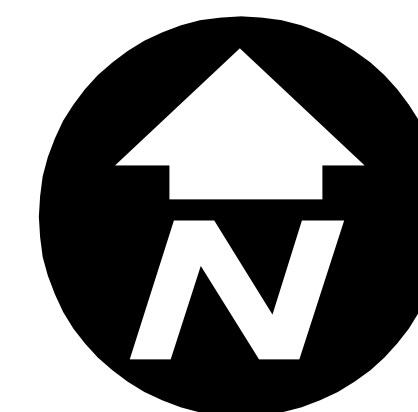
- Legend**
- Levee Alignment
 - Marsh Buffer
 - Reef Restoration
 - Beneficial Use of Dredged Material
 - Dredged Material Placement
 - Bank Stabilization
 - Freshwater Diversion
 - Shoreline Protection
 - Shoreline Restoration
 - PU_3b_Buffer

- MEASURES:**
- Construct hurricane protection (30-foot storm surge at the coastline) for Berwick and Patterson and levee alignment south of the GIWW from the Wax Lake Outlet to Freshwater Bayou.
 - Complete/Accelerate the Louisiana Coastal Area (LCA) Near-Term Plan including:
 - Stabilize Gulf shoreline at Pointe Au Fer Island
 - Convey Atchafalaya River water to northern Terrebonne marshes
 - Acadiana Bays Estuarine Restoration Feasibility Study
 - Upper Atchafalaya Basin Study
 - Create marsh at Weeks Bay.
 - Rebuild historic reefs.
 - Restore marsh at Marsh Island south shoreline and Rainey Marsh via dedicated dredging.
 - Maintain north shore of East Cote Blanche Bay at Point Marone.
 - Restore Vermilion Bay and West Cote Blanche Bay shorelines via beneficial uses of dredged material and/or detached breakwaters.
 - Maintain Vermilion Bay East and West Cote Bay as brackish environments.
 - Beneficial uses of dredged material and dedicated dredging wherever possible to rebuild marsh, shorelines and barrier islands.
 - * Strategize and implement plan to elevate and/or relocate assets located outside the hurricane protection plans.
 - Freshwater Bayou Bank Stabilization – Belle Isle to Lock.
- * Not tied to geographic location.



LOUISIANA COMPREHENSIVE COASTAL
PROTECTION MASTER PLAN

FIGURE 5.4
PLANNING UNIT 3b
ALTERNATIVE ONE



0 2 4 8 12 Miles

1:253,440

1 inch equals 4 miles

Legend

- Levee Alignment
- Marsh Buffer
- Reef Restoration
- Beneficial Use of Dreged Material
- Dredged Material Placement
- Bank Stabilization
- Freshwater Diversion
- Shoreline Protection
- Shoreline Restoration
- PU_3b_Buffer

MEASURES:

1. Construct hurricane protection (30-foot storm surge at the coastline) for Berwick and Patterson and levee alignment from Wax Lake Outlet to the Vermilion River following the USACE West Levee Alignment 3A (shown in red on the USACE Levee Alignment Map).
2. Complete/ Accelerate the Louisiana Coastal Area (LCA) Near-Term Plan including:
 - a) Stabilize Gulf shoreline at Point Au Fer Island.
 - b) Convey Atchafalaya River Water to Northern Terrebonne marshes.
 - c) Acadiana Bays Estuarine Restoration Feasibility Study.
 - d) Upper Atchafalaya Basin Study.
3. Create marsh at Weeks Bay.
4. Increase sediment transport from the Atchafalaya River down Wax Lake Outlet.
5. Stabilize banks of Southwest Pass off Marsh Island.
6. Maintain north shore of East Cote Blanche Bay at Point Marone.
7. Stabilize banks of the GIWW.
8. Restore Vermilion Bay and West Cote Blanche Bay shorelines via beneficial use of dredged material and detached breakwaters.
9. Stabilize shorelines from Planning Unit 4 boundary past Tigre Point to Southwest Point using dredged sediments and/or breakwaters.
10. Stabilize shorelines across south shoreline of Marsh Island from Lighthouse Point to South Point (east of Mound Point) using dredged sediments and/or breakwaters.
11. Beneficial use of dredged material and dedicated dredging wherever possible to rebuild marsh shorelines, historic reefs and barrier islands.
12. Restore marsh at Marsh Island south shoreline and Rainey marsh via dedicated dredging and beneficial use of dredged material.
- * 13. Strategize and implement plan to elevate and/or relocate assets located outside of the hurricane protection plans.
14. Freshwater Bayou Bank Stabilization – Belle Isle to Freshwater Lock.

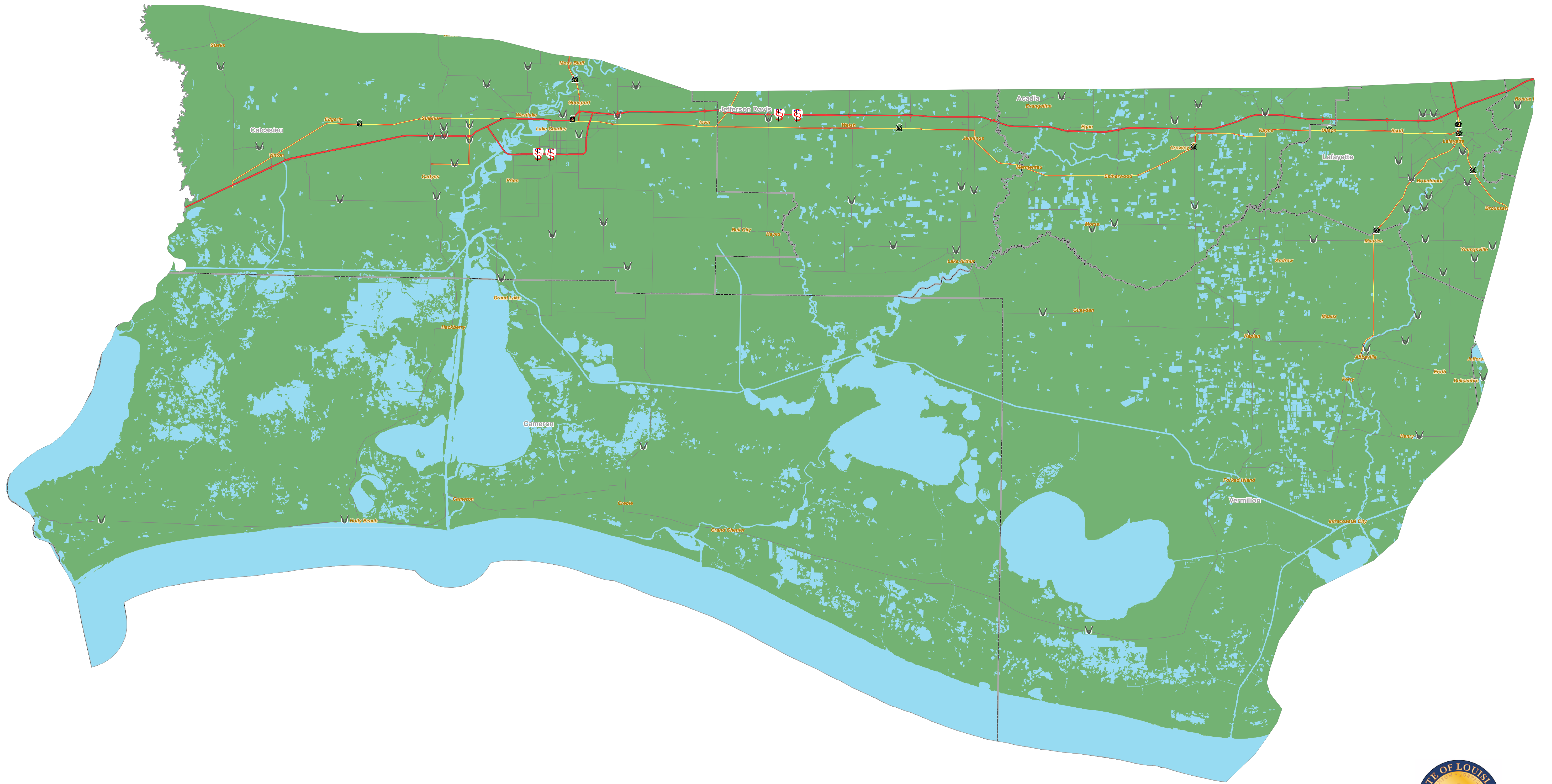
* Not tied to a specific geographic location.









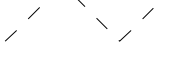

LOUISIANA COMPREHENSIVE COASTAL
PROTECTION MASTER PLAN

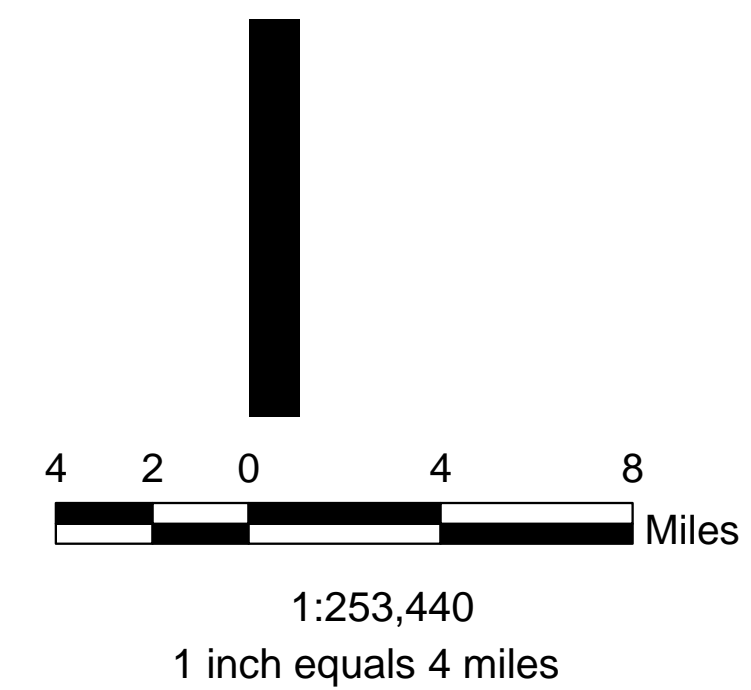
FIGURE 5.5

PLANNING UNIT 3b
ALTERNATIVE TWO



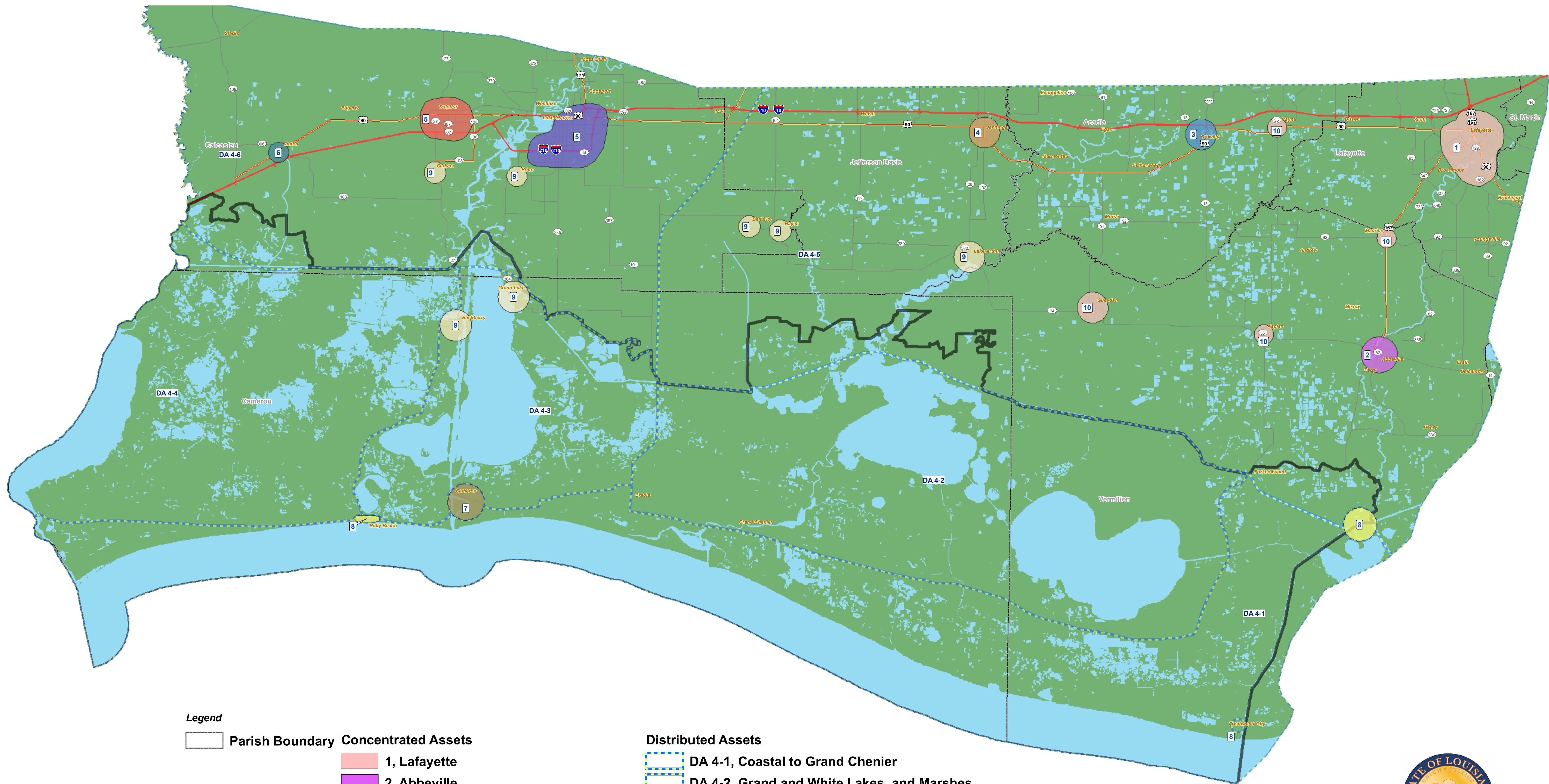
Legend

- | | | | |
|---|-----------------|---|-----------------|
|  | Land |  | Limited Access |
|  | Water |  | Highways |
|  | Parish Boundary |  | Secondary Roads |
| | |  | Other |
| | |  | Highway Ramp |



LOUISIANA COMPREHENSIVE COASTAL
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FIGURE 6.1
PLANNING UNIT 4
BOUNDARY AND BASE MAP



Legend



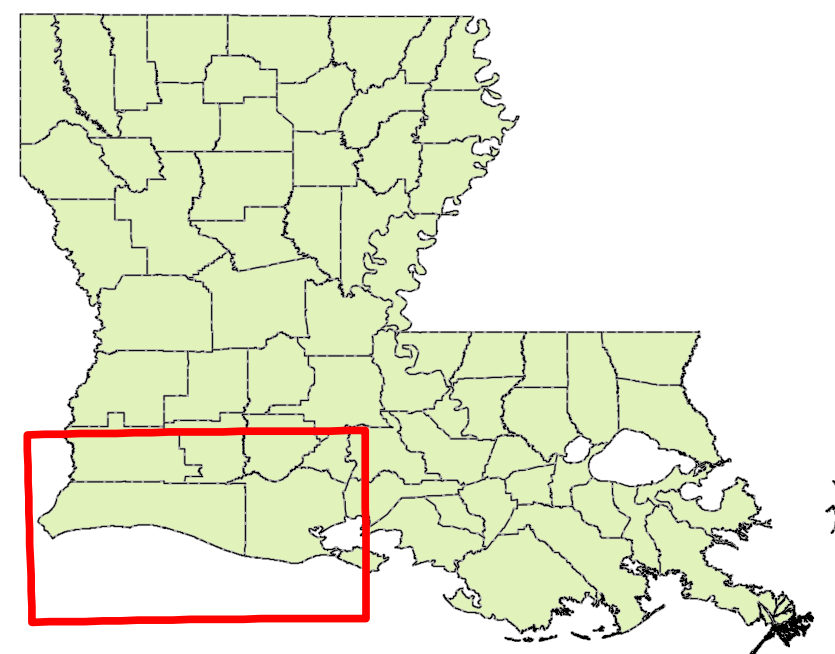
Parish Boundary

Concentrated Assets

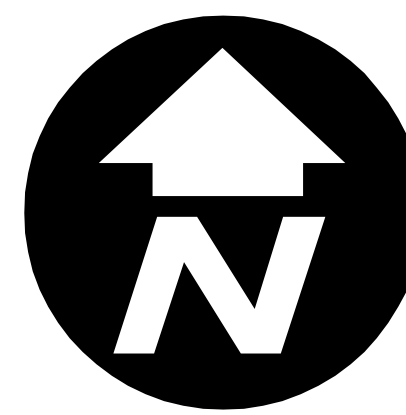
- 1, Lafayette
- 2, Abbeville
- 3, Crowley
- 4, Jennings
- 5, Lake Charles
- 5, Sulphur
- 6, Vinton
- 7, Cameron
- 8, Coastal Communitieis
- 9, Western Central CZM Communities
- 10, Agricultural & Crawfish Communities

Distributed Assets

- DA 4-1, Coastal to Grand Chenier
- DA 4-2, Grand and White Lakes, and Marshes
- DA 4-3, Calcasieu to Gulf Corridor
- DA 4-4, Sabine Marshes
- DA 4-5, Acadian Parishes
- DA 4-6, Vicinity of Lake Charles



Map Document: (K:\DNR\GIS_Documents\Project_Maps\MXD\Area 4\Final\dnr_area_4_0002_concentrate_assets_final.mxd)
5/11/2006 -- 7:55:14 PM



0 2 4 8 12
Miles

1:248,043
1 inch equals 3.91 miles



LOUISIANA COMPREHENSIVE COASTAL
PROTECTION MASTER PLAN

FIGURE 6.2

**PLANNING UNIT 4
CONCENTRATED ASSETS AND
DISTRIBUTED ASSETS**

PLANNING UNIT 4: Freshwater Bayou to Sabine River

Table 6.1 Relative Damages from Storm Surge to Concentrated Assets

Proportion of assets damaged or destroyed due to storm surge: EL = Extremely Low (0-5%) L = Low (5 - 15%) M = Medium (15 - 25%) H = High (25 - 50%) EH = Extremely High (>50%)	Storm Surge at Coastline (Feet)	Lafayette	Abbeville	Crowley	Jennings	Lake Charles	Vinton	Cameron	Coastal Communities	West Central CZM Towns	Agriculture & Crawfish Towns
	5	EL	EL	EL	EL	EL	EL	EL	EL	EL	EL
	10	EL	EL	EL	EL	L	EL	EL	EL	EL	EL
	15	EL	H	EL	EL	H	EL	EL	EL	EL	EL
	20	EL	H	EL	EH	EH	EL	H	H	H	EH
	25	EH	EH	EL	EH	EH	EH	EH	EH	EH	EH
	30	EH	EH	EH	EH	EH	EH	EH	EH	EH	EH

Table 6.2 Concentrated Assets Scoring

Scoring Criteria	Maximum Score for Resource	Lafayette	Abbeville	Crowley	Jennings	Lake Charles	Vinton	Cameron	Coastal Communities	West Central CZM Towns	Agriculture & Crawfish Towns
1. Residences	25	20	12	5	8	20	5	5	5	12	5
2. Industry	20	5	5	5	5	20	5	15	5	5	15
3. Infrastructure	15	15	10	5	5	15	5	5	5	5	5
4. Institutional and Publicly Owned Facilities	15	15	10	5	5	15	5	10	5	10	5
5. Strategic Resources	25	10	5	5	5	25	5	17	5	10	5
Total Score	100	65	42	25	28	95	25	52	25	42	35

Table 6.3 Relative Damages from Storm Surge to Distributed Assets¹

Proportion of assets damaged or destroyed due to storm surge: EL = Extremely Low (0-5%) L = Low (5 - 15%) M = Medium (15 - 25%) H = High (25 - 50%) EH = Extremely High (>50%)	Storm Surge at Coastline (Feet)	DA-1 Coastal to Grand Chenier	DA-2 Grand and White Lakes and Marshes	DA-3 Calcasieu to Gulf Corridor	DA-4 Sabine Marshes	DA-5 Arcadian Parishes	DA-6 Vicinity of Lake Charles
	5	EL	EL	EL	EL	EL	EL
	10	EH	EH	EH	EH	EH	EH
	15	EH	EH	EH	EH	EH	EH
	20	EH	EH	EH	EH	EH	EH
	25	EH	EH	EH	EH	EH	EH
	30	EH	EH	EH	EH	EH	EH

¹ Assets outside of the defined concentrated areas (see Concentrated and Distributed Assets Map)

Table 6.4 Scoring of Distributed Assets

Scoring Criteria	Maximum Score for Resources	DA-1 Coastal to Grand Chenier	DA-2 Grand and White Lakes and Marshes	DA-3 Calcasieu to Gulf Corridor	DA-4 Sabine Marshes	DA-5 Arcadian Parishes	DA-6 Vicinity of Lake Charles
National Significance	25	10	10	15	5	10	25
State Significance	25	10	10	15	5	10	25
Local Significance	25	25	25	25	25	25	25
Critical to Recovery	25	10	10	10	10	25	25
Total Score	100	55	55	65	45	70	100

TABLE 6.5. DISTRIBUTED ASSETS IDENTIFICATION FOR PLANNING UNIT 4

The land outside the defined communities was divided into areas of surge impact commonality. For Planning Unit 4 these are defined by the significant water bodies that impact these areas:

Coast to Grand Chenier	= DA 4-1
Grand & White Lakes & Marshes	= DA 4-2
Calcasieu to Gulf Corridor	= DA 4-3
Sabine Marshes	= DA 4-4
Acadian Parishes	= DA 4-5
Vicinity of Lake Charles	= DA 4-6

Within these areas following assets are comprised:

	Assets	Oil & Gas	Pipelines	Highway, Bridges & Transportation	Evacuation Routes	Ports, Waterway & Infrastructure	Other Strategic Assets
DA 4-1	Oil & Gas Fields and Pipelines		X				
	Hwy 82			X	X		
DA 4-2	Oil & Gas Fields and Pipelines	X	X				
	GIWW					X	
	Vermilion Lock					X	
	Hwy 82, Schooner & GIWW Bridges			X	X		
	Southern Pacific RR			X			
DA 4-3	Calcasieu Ship Channel					X	
	Oil & Gas Fields and Pipelines	X	X				
	GIWW					X	
	Hwy 27, GIWW Bridge			X	X		
DA 4-4	Oil & Gas Fields and Pipelines	X					
	GIWW					X	

TABLE 6.5. DISTRIBUTED ASSETS IDENTIFICATION FOR PLANNING UNIT 4

The land outside the defined communities was divided into areas of surge impact commonality. For Planning Unit 4 these are defined by the significant water bodies that impact these areas:

Coast to Grand Chenier	= DA 4-1
Grand & White Lakes & Marshes	= DA 4-2
Calcasieu to Gulf Corridor	= DA 4-3
Sabine Marshes	= DA 4-4
Acadian Parishes	= DA 4-5
Vicinity of Lake Charles	= DA 4-6

Within these areas following assets are comprised:

DA 4-5	Hwy 82			X	X		
	Hwy 165			X	X		
	I-10			X	X		
	Hwy 14			X	X		
DA 4-6	Oil & Gas Fields and Pipelines	X	X				
	Hwy 27			X	X		
	I-10			X	X		
	Hwy 14			X	X		
	Calcasieu Ship Channel					X	

Table 6.6. Planning Unit 4 Existing Conditions/ Problem Identification

NOTE: Rankings are only relatable within an ecosystem unit; the purpose is not to prioritize between units, but rather to prioritize function disruptions within ecosystem units

Function Disruption (System Threat)	Ecosystem Unit			
	EU 4-1	EU 4-2	EU 4-3	EU 4-4
	Grand/White Lake	Eastern Chenier	Western Chenier	Calcasieu/Sabine Lakes
Subsidence	L	L	L	L
Tidal Exchange	NI	H	L	L
Sediment Disruptions	L	M	M	L
Salt Water Intrusion	NI	NI	NI	H
Altered Inundation	H	H	H	H
Wave/Wake Energy	H	H	H	H
Direct Removal	H	M	M	H

No Impact

NI

Low

L

Moderate

M

High

H

Very High

VH

Subsidence = true subsidence; benchmark elevations not referenced to tide gauges

Tidal Exchange = Daily tide energy; assumed to be more destructive to historically fresh/intermediate wetlands, more beneficial to brackish/saline wetlands

Sediment Disruptions = disconnection from riverine sources

Saltwater Intrusion = due to encroachment of Gulf on landscape edge or movement up canals & channels

Altered Inundation = altered frequency or duration of inundation, not related to RSLR; e.g., impoundments

Wave/Wake Energy = includes storm energy

Direct Removal = dredging sediments or covering by spoil banks & levees.

Table 6.7. Planning Unit 4 Changes in Natural Resources, 1990 - 2050 (From Coast 2050 Report; LCA Land Change Map)

Resource	Ecosystem Unit			
	EU 4-1 Grand/White Lake	EU 4-2 Eastern Chenier	EU 4-3 Western Chenier	EU 4-4 Calcasieu/Sabine Lakes
Swamp	NA	NA	NA	NA
Fresh/Intermediate Marsh	L	L	L	L
Brackish/Saline Marsh	NA	M	M	M
Beach/Dune/Back Barrier Marsh	NA	H	M	NA
Sessile Estuarine (Oysters)	NI	I	S	S
Saltwater (Red Drum)	D	D	S	D
Freshwater (Largemouth Bass)	S	I	I	S
Estuarine (Spotted Seatrout)	D	D	S	D
Estuarine (Shrimp)	D	D	S	D
Woodland Edge (Deer)	S	D	D	S
Woodland Avifauna	D	D	D	D
Fresh Wetlands (Alligator)	S	S	S	S
Muskrat	I	S	S	S
Shore Birds	D	D	D	D
Loss of Storm Attenuation***	L	M	M	M

Wetland Key

No Impact	NI
Low Loss	L
Moderate Loss	M
High Loss	H
Increase	I
Not Applicable	NA

% Change

0
1-15
16-49
>50

Fish & Wildlife Key

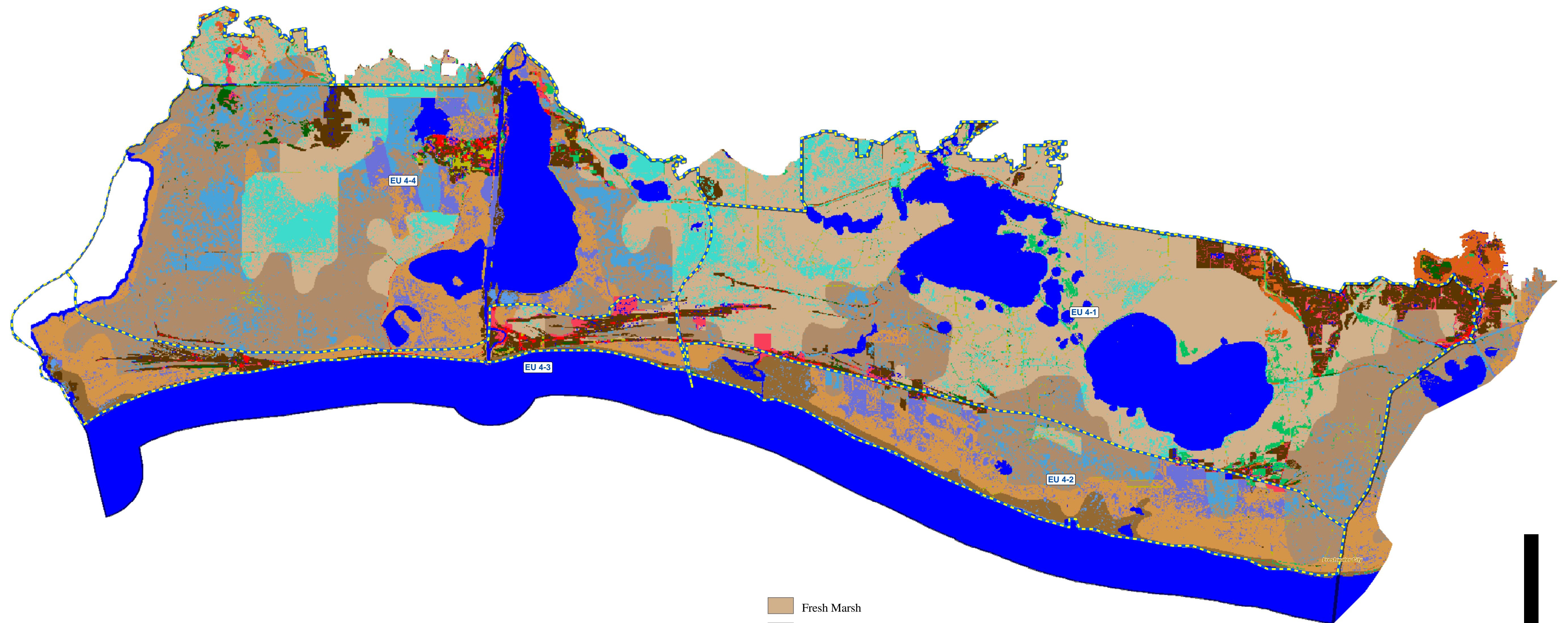
No Impact/Not historically present	NI
Steady	S
Decrease	D
Increase	I
Unknown (No information)	U

NOTES:

* = Small acreage by percentage w/in ecosys unit

** = Lake Pontchartrain Atlas

*** = Using land change as the surrogate for changes in storm attenuation capacity

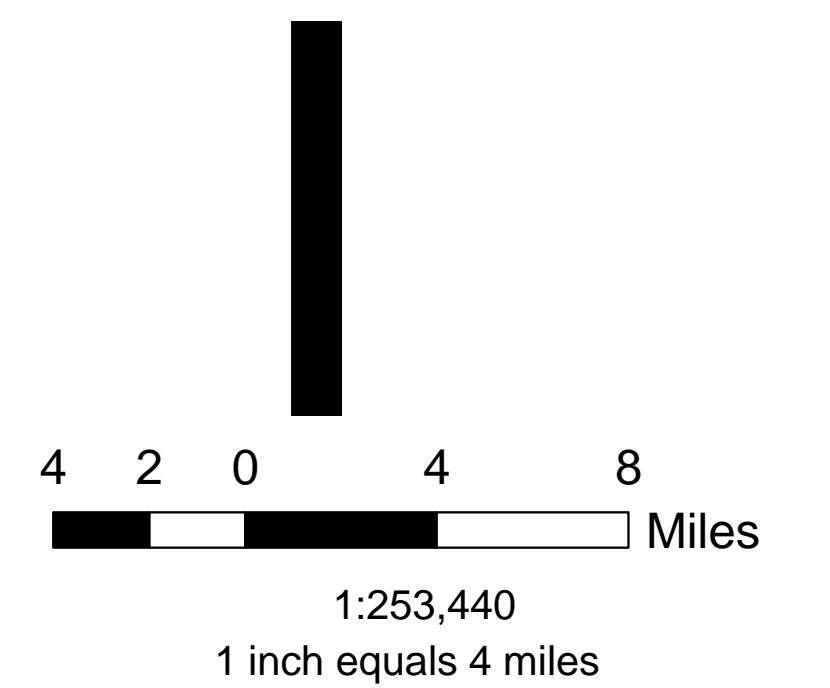


Legend

Ecological Units

	EU 4-1, Grand/White Lake
	EU 4-2, Eastern Chenier
	EU 4-3, Western Chenier
	EU 4-4, Calcasieu/Sabine Lakes

- Fresh Marsh
- Intermediate Marsh
- Brackish Marsh
- Saline Marsh
- Non-wetland
- Swamp
- Wetland Forest
- Wetland Shrub/Scrub
- Upland Shrub/Scrub
- Ag/Pasture
- Developed
- Barren
- Water



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FIGURE 6.3

PLANNING UNIT 4
ECOSYSTEM UNITS/NATURAL RESOURCES

Table 6.8a Planning Unit 4: Objectives and Measures Table - Concentrated Assets

	Geographic Location	Current Issues*	Future Risk/Impact	Planning Unit Objective	Coastal Objectives	Measures																														
						1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
						Proposed Hurricane Protection Levees for 30-ft storm surge	Complete/Accelerate the Greater Plaquemine Freshwater and Sediment Management and Allocation Reassessment Study which was included in the LCA Near-Term Plan	Maximize freshwater inflow from Sabine River	Salinity Control structures along the east shoreline of Lake Calcasieu	Beneficial Uses of dredged material Program: utilize sediment	Salinity control structure at Sabine Pass nr Hwy 82 Causeway.	Stabilize Gulf shoreline and beach west of Calcasieu River to Sabine River using dredged sediment or breakwaters	Stabilize Gulf shoreline and beach east of Calcasieu River to Freshwater Bayou using dredged sediment or breakwaters	Salinity control structure in Calcasieu Ship Channel nr ferry.	Beneficial Uses or dredged material Program: utilize sediment and dedicated dredging for marsh enhancement and construction of terraces in Calcasieu Lake	Salinity control structures at points on east side of Calcasieu Lake to aid in salinity control.	Maximize freshwater inflow to tributaries of the Mermentau from outside sources.	Maximize freshwater inflow to Mermentau from outside sources.	Stabilize Grand Lake shoreline and land bridge.	Freshwater Introduction/Retention structure or sill on Little Pecan Bayou	Freshwater Introduction/Retention structure or sill on Rollover Bayou	Stabilize White Lake shoreline and land bridge.	Stabilize banks from Schooner Bayou to GWW along Freshwater Bayou and along GWW nr White Lake	Salinity Control on Black Lake Bayou nr Hackberry.	Build new chamber for navigation at Calcasieu Lock on GWW and use old lock to evacuate excess water.	Stabilize banks of Freshwater Bayou	Stabilize eastern shore of Lake Calcasieu	Develop a plan to elevate and/or relocate assets located outside the hurricane protection levee	Maintain Hwy 82 for hurricane evacuation and marsh protection	Provide water control structures at strategic locations along Hwys 82 and 27.	Manage watershed to reduce rapid inflows into Mermentau Sub-basin	Restore Marsh by Filling Abandoned Canals.	Utilize Freshwater inflow from Atchafalaya River.	Improve hydrology of the old Mermentau River Channel between Mud Lake and Goli.	Stabilize Banks of GWW	Toll road on top of levee south of GWW.
Alt 1**	Alt 1, 2	Alt 1, 2	Alt 1, 2	Alt 1, 2	Alt 1	Alt 1, 2	Alt 1, 2	Alt 1	Alt 1, 2	Alt 1	Alt 1	Alt 1, 2	Alt 1	Alt 1	Alt 1, 2	Alt 1, 2	Alt 1, 2	Alt 1	Alt 1, 2	Alt 1, 2	Alt 1, 2	Alt 1, 2	Alt 1, 2	Alt 2	Alt 1	Alt 1, 2	Alt 1	Alt 1, 2	Alt 1	Alt 1, 2	Alt 1					
Concentrated Assets	Lafayette	Extremely high level of flood risk to Concentrated Assets with storm surges over 25 ft.	Increased flood risk to assets due to sea level rise, subsidence, and wetland loss.	Provide coastal protection to Lafayette concentrated assets	A, D, E	+							+											+												
	Abbeville	High level of flood risk to Concentrated Assets with storm surges over 15 ft.	Increased flood risk to assets due to sea level rise, subsidence, and wetland loss.	Provide coastal protection to Abbeville concentrated assets	A, D	+							+										+													
	Crowley	Extremely high level of flood risk to Concentrated Assets with storm surges over 30 ft.	Increased flood risk to assets due to sea level rise, subsidence, and wetland loss.	Provide coastal protection to Crowley concentrated assets	A, D	+																														
	Jennings	Extremely high level of flood risk to Concentrated Assets with storm surges over 20 ft.	Increased flood risk to assets due to sea level rise, subsidence, and wetland loss.	Provide coastal protection to Jennings concentrated assets	A, D	+																														
	Lake Charles	High level of flood risk to Concentrated Assets with storm surges over 15 ft.	Increased flood risk to assets due to sea level rise, subsidence, and wetland loss.	Provide coastal protection to Lake Charles concentrated assets	A, D, E	+							+		+	+							+													
	Vinton	Extremely high level of flood risk to Concentrated Assets with storm surges over 25 ft.	Increased flood risk to assets due to sea level rise, subsidence, and wetland loss.	Provide coastal protection to Vinton concentrated assets	A, D	+							+																							
	Cameron	Extremely high level of flood risk to Concentrated Assets with storm surges over 5 ft.	Loss of concentrated assets will be catastrophic and risk will increase due to sea level rise, subsidence, and wetland loss.	Provide coastal protection to Cameron concentrated assets	A, D	+							+													+	+									
	Coastal Communities	Extremely high level of flood risk to Concentrated Assets with storm surges over 5 ft.	Loss of concentrated assets will be catastrophic and risk will increase due to sea level rise, subsidence, and wetland loss.	Provide coastal protection to Intercoastal City, Freshwater City and Holly Beach concentrated assets	A, D	+							+	+											+	+										
	Western Central Coastal Zone Management Communities	Extremely high level of flood risk to Concentrated Assets with storm surges over 10 ft.	Loss of concentrated assets will be catastrophic and risk will increase due to sea level rise, subsidence, and wetland loss.	Provide coastal protection to Hackberry, Grand Lake, Carlyss, Prien, Bell City, Hayes, and Lake Arthur concentrated assets	A, D	+							+	+	+	+			+		+															
	Agricultural & Crawfish Towns	Extremely high level of flood risk to Concentrated Assets with storm surges over 10 ft.	Loss of concentrated assets will be catastrophic and risk will increase due to sea level rise, subsidence, and wetland loss.	Provide coastal protection to Gueydon, Kaplan, Maurice and Rayne concentrated assets	A, D	+								+				+		+																

* Current issues, percent flooded: H = High (25-50%); EH= Extremely High (> 50%)
** Alternative Plan (Measure used in Alternative Plans)

Coastwide Objectives:

A - Reduce storm damage vulnerability of coastal communities, resources, and infrastructure.
B - Minimize exposure of traditional flood protection measures to open Gulf conditions.
C - Increase sediment input from sources outside estuarine basins, and manage existing sediment resources within estuarine basines, to sustain and rejuvenate existing wetlands, rebuild marsh substrate and construct flood protections projects.
D - Maintain or establish natural landscape features and hydrologic processes that are critical to sustainable ecosystems structure and function, including dissipation of storm energy.
E - Establish or maintain dynamic salinity gradients that reflect natural cycles of freshwater availability and marine forcing (fluctuation related to normal daily and seasonal tide action or exchange).
F - Sustain productive and diverse wildlife habitats.
G - Maximize retention of river-borne sediments and nutrients within coastal wetlands.

Table 6.8b Planning Unit 4: Objectives and Measures Table - Distributed Assets

	Geographic Location	Current Issues*	Future Risk/Impact	Planning Unit Objective	Coastal Objectives	Measures																														
						1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
						Proposed Hurricane Protection Levee for 30-ft storm surge Complete/accelerate the Chenier Plain Freshwater and Sediment Management and Allocation Reassessment Study which was included in the LCA Near Term Plan	Complete/accelerate the Chenier Plain Freshwater and Sediment Management and Allocation Reassessment Study which was included in the LCA Near Term Plan	Maximize freshwater inflow from Sabine River	Salinity Control structures along the east shoreline of	Beneficial Uses of dredged material Program; utilize s	Salinity control structure at Sabine Pass nr Hwy 82 Causeway.	Stabilize Gulf shoreline and beach west of Calcasieu River to Sabine River using dredged sediment or breakwaters	Stabilize Gulf shoreline and beach east of Calcasieu River to Freshwater Bayou using dredged sediment or breakwaters	Salinity control structure in Calcasieu Ship Channel nr ferry.	Beneficial Uses of dredged material program; utilize sediment and dedicated dredging for marsh enhancement and construction of terraces in Calcasieu Lake.	Salinity control structures at points on east side of Calcasieu Lake to aid in salinity control.	Maximize freshwater inflow to tributaries of the Mermentau from outside sources.	Maximize freshwater inflow to Mermentau from outside sources.	Stabilize Grand Lake shoreline and land bridge.	Freshwater Introduction/Retention structure or sill on Little Pecan Bayou	Freshwater Introduction/Retention structure or sill on Rakever Bayou	Stabilize White Lake shoreline and land bridge.	Stabilize banks from Schooner Bayou to GIWW along Freshwater Bayou and along GIWW nr White Lake	Salinity Control on Black Lake Bayou nr Hackberry.	Build new chamber for navigation at Calcasieu Lock on GIWW and use old lock to evacuate excess water	Stabilize banks of Freshwater Bayou	Stabilize eastern shore of Lake Calcasieu	Develop a plan to elevate and/or relocate assets located outside the hurricane protection Levee	Maintain Hwy 82 for hurricane evacuation and marsh protection	Provide water control structures at strategic locations along Hwy's 82 and 27.	Manage watershed to reduce rapid inflows into Mermentau Sub-basin	Restore Marsh by Filling Abandoned Canals.	Utilize freshwater inflow from Atchafalaya River.	Improve hydrology of the old Mermentau River Channel between Mud Lake and GOM.	Stabilize Banks of GIWW	Toll road on top of levee south of GIWW.
Alt 1	Alt 1, 2	Alt 1, 2	Alt 1, 2	Alt 1, 2	Alt 1	Alt 1, 2	Alt 1, 2	Alt 1	Alt 1, 2	Alt 1	Alt 1	Alt 1	Alt 1, 2	Alt 1	Alt 1	Alt 1, 2	Alt 1, 2	Alt 1	Alt 1, 2	Alt 1, 2	Alt 1, 2	Alt 1, 2	Alt 1, 2	Alt 2	Alt 1	Alt 1, 2	Alt 1	Alt 1, 2	Alt 1	Alt 1, 2	Alt 1					
Distributed Assets	DA4-1. Coast to chenier ridge at Highway 82	High level of flood risk to Distributed Assets with storm surges over 5 ft.	Increased flood risk to assets due to sea level rise, subsidence, and wetland loss.	Maintain and protect evacuation routes between the coast and I-10.	A, D							+	+																					+		
				Protect lakes, ponds and gulf shore lines and maintain beaches	A, D, F		+							+	+																					
				Provide coastal protection to oil and gas fields and pipelines.	A		+							+	+									+									+	+		
	DA4-2. Grand/White Lakes and marshes	Extremely high level of flood risk to Distributed Assets with storm surges over 5 ft	Increased flood risk to distributed assets due to sea level rise, subsidence, loss of the cheniers and wetland loss.	Provide coastal protection to oil and gas fields and pipelines.	A		+							+						+	+															
				Provide coastal protection to GIWW.	A	+								+								+													+	
				Provide coastal protection to Vermilion Lock.	A									+																		+	+		+	
				Provide outlets for freshwater flow under Louisiana Highway 82	D, F	+	+							+					+			+												+		
				Reduce wave/wake impacts on the shorelines of White and Grand Lakes to protect the integrity of the land bridge between them	A, D, F	+	+												+			+												+		
				Maintain and protect evacuation routes between the coast and I-10.	A									+																	+	+			+	
	DA4-3. Calcasieu to Gulf Corridor	Extremely high level of flood risk to Distributed Assets with storm surges over 5 ft	Increased flood risk to assets due to sea level rise, subsidence, loss of the cheniers and wetland loss.	Provide coastal protection to GIWW.	A								+																				+			
				Provide coastal protection to Strategic Oil Reserves, oil and gas facilities and pipelines	A		+						+	+		+								+												
				Provide coastal protection to Calcasieu Ship Channel.	A	+									+																					
				Protect lakes, ponds and gulf shore lines and maintain beaches	A, D, F		+							+											+	+	+									
				Provide coastal protection to Oil and Gas Production facilities	A	+					+		+	+	+	+									+											
				Maintain and protect evacuation routes between the coast and I-10.	A								+	+		+																+				+
	DA4-4. Sabine Marshes and Lake	Extremely high level of flood risk to Distributed Assets with storm surges over 5 ft	Increased flood risk to assets due to sea level rise, subsidence, loss of the cheniers and wetland loss.	Provide coastal protection to GIWW.	A					+		+																+			+	+		+		
				Provide coastal protection to oil and gas fields and pipelines.	A		+				+		+			+																				
				Protect lakes, ponds and gulf shore lines and maintain beaches	A, D, F		+						+																							
				Promote the use of sediment from source: outside of this Planning Unit, such as trapping sediment moving off-shore to increase wetland	A, C		+				+				+																	+	+			
	DA4-5. Acadian Parishes	Extremely high level of flood risk to Distributed Assets with storm surges over 10 ft.	Increased flood risk to assets due to sea level rise, subsidence, loss of the cheniers and wetland loss.	Provide coastal protection to SP Railroad.	A																															
				Provide coastal protection for the oil and gas facilities, strategic petroleum reserves, including Henry Hub, ports and waterborne	A		+																													
				Maintain and protect evacuation routes between the coast and I-10.	A								+		+																					+
	DA4-6. Vicinity of Lake Charles	Extremely high level of flood risk to Distributed Assets with storm surges over 10 ft.	Increased flood risk to assets due to sea level rise, subsidence, loss of the cheniers and wetland loss.	Provide coastal protection for the oil and gas facilities, strategic petroleum reserves, ports and waterborne commerce facilities	A		+					+		+																						
				Protect lakes, ponds and gulf shore lines and maintain beaches	A, D, F		+						+																							
				Provide coastal protection to Calcasieu Ship Channel.	A						+				+														+							
				Maintain and protect evacuation routes between the coast and I-10.	A								+		+																					+

* Current issues, percent flooded: H = High (25-50%); EH= Extremely High (> 50%)
** Alternative Plan (Measure used in Alternative Plans)

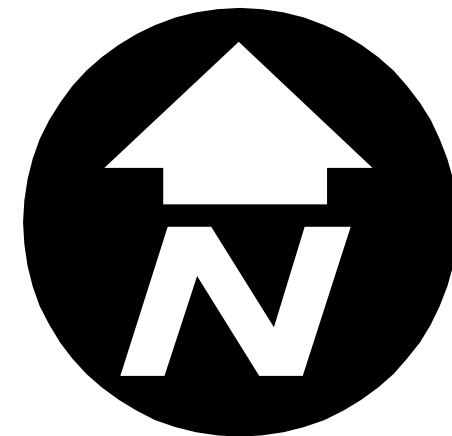
Coastwide Objectives:
A - Reduce storm damage vulnerability of coastal communities, resources, and infrastructure.
B - Minimize exposure of traditional flood protection measures to open Gulf conditions.
C - Increase sediment input from sources outside estuarine basins, and manage existing sediment resources within estuarine basines, to sustain and rejuvenate existing wetlands, rebuild marsh substrate and construct flood protections projects.
D - Maintain or establish natural landscape features and hydrologic processes that are critical to sustainable ecosystems structure and function, including dissipation of storm energy.
E - Establish or maintain dynamic salinity gradients that reflect natural cycles of freshwater availability and marine forcing (fluctuation related to normal daily and seasonal tide action or exchange).
F - Sustain productive and diverse wildlife habitats.
G - Maximize retention of river-borne sediments and nutrients within coastal wetlands.

Table 6.8c Planning Unit 4: Objectives and Measures Table - Ecosystem Units

	Geographic Location	Current Issues	Future Risk/Impact*	Planning Unit Objective	Coastal Objectives	Measures																																
						1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31		
						Alt 1	Alt 1, 2	Alt 1, 2	Alt 1, 2	Alt 1, 2	Alt 1	Alt 1, 2	Alt 1, 2	Alt 1	Alt 1, 2	Alt 1	Alt 1	Alt 1, 2	Alt 1	Alt 1	Alt 1, 2	Alt 1	Alt 1, 2	Alt 1, 2	Alt 1, 2	Alt 1, 2	Alt 1, 2	Alt 1, 2	Alt 1, 2	Alt 1, 2	Alt 1, 2	Alt 1, 2	Alt 1	Alt 1, 2	Alt 1	Alt 1, 2	Alt 1	
Ecosystem Units	EU4-1. Grand/White Lakes	Function disruption due to subsidence, altered inundation, wave/wake energy, direct removal of sediments for spoil banks or levees.	Low loss of fresh/intermediate marsh, surge attenuation and decrease in fisheries and Avifauna.	Provide outlets for fresh water flow under Louisiana Highway 82.	D, F		+																															
				Promote a diversity of unique, regional habitats such as cheniers, prairies, and forested areas.	D, F		+																															
				Restore natural hydrology to the Chenier Plain.	D, F		+										-	-							+						+	+				+		
	EU4-2. Eastern Chenier	Function disruption due to subsidence, tidal exchange, altered inundation, sediment disruption, and wave/wake energy.	Low loss of Fresh/Intermediate Marsh; Moderate Loss of Brackish/Saline Marsh & surge attenuation; High Loss of Beach/Dune/Bak Barrier Marsh; Decrease in fisheries, wildlife and Avifauna	Promote a diversity of unique, regional habitats such as cheniers, prairies, and forested areas.	D, F		+																												+			
				Restore/preserve the existing and unique chenier ridges to contribute to surge and wave dissipation.	A, D, F	+																														+		
				Restore natural hydrology to the Chenier Plain.	D, F		+																														+	
				Promote the use of sediment from sources outside of this Planning Unit, such as trapping sediment moving off-shore to increase wetland acres and	A, C	+	+																											+				
				Protect the lakes, ponds, and Gulf shorelines from wave/wake impacts, and maintain existing beaches	A, D, F	+																												+				
	EU4-3. Western Chenier	Function disruption due to subsidence, altered inundation, and wave/wake energy.	Moderate Loss of Brackish/Saline Marsh, Beach/Dune/Bak Barrier Marsh & Surge attenuation; Decrease in fisheries, wildlife and Avifauna.	Restore natural hydrology to the Chenier Plain	D, F		+	+																						+	+	+	-	+				
				Promote a diversity of unique, regional habitats such as cheniers, prairies, and forested areas.	D, F																															+		
				Protect the lakes, ponds, and Gulf shorelines from wave/wake impacts, and maintain existing beaches	A, D, F										+	+											+											
				Promote the use of sediment from sources outside of this Planning Unit, such as trapping sediment moving off-shore to increase wetland acres and	A, C	+	+								+	+																		+				
				Control the salinity gradient in Planning Unit 4 to promote diversity of ecosystem habitat.	E, F				+	+			+				+	+	+			+	+										+	+	+			
				Restore/preserve the existing and unique chenier ridges to contribute to surge and wave dissipation.	A, D, F	+	+							+	+																					+		
				Balance the fresh water needs for agriculture, municipal, industrial, and natural ecosystem needs and uses.	E, F		+	+										+	+											+				+				
	EU4-4. Calcasieu/Sabine Lakes	Function disruption due to subsidence, altered inundation, salt water intrusion, wave/wake energy, direct removal of sediments for spoil banks or levees	Moderate loss of brackish/saline marsh, beach/dune/back barrier marsh, storm attenuation and decrease in fisheries and Avifauna.	Restore more natural hydrology to the Chenier Plain.	D, F		+	+																					+	+	+		+					
				Provide additional freshwater from sources outside the basin.	E		+											+	+															+				
				Promote the beneficial uses of dredged material from the Calcasieu Ship Channel, the Mermentau River and the Sabine River to create marsh.	C																																	
				Balance the fresh water needs for agriculture, municipal, industrial, and natural ecosystem needs and uses.	D, E, F		+	+										+	+											+	+		+					
				Control the salinity gradient in Planning Unit 4 to promote diversity of ecosystem habitat.	E, F		+	+	+				+				+	+	+			+	+										+	+	+			

* Ecosystems Unit Future Risk, percent changed: L= Low Loss (1-15); M = Moderate Loss (16-49); H = High Loss (> 5); Increase (I); Not Applicable (NA); Steady (S); Decrease (D); Increase (I); Unknown (U)
** Alternative Plan (Measure used in Alternative Plans)

Coastwide Objectives:
A - Reduce storm damage vulnerability of coastal communities, resources, and infrastructure.
B - Minimize exposure of traditional flood protection measures to open Gulf conditions.
C - Increase sediment input from sources outside estuarine basins, and manage existing sediment resources within estuarine basines, to sustain and rejuvenate existing wetlands, rebuild marsh substrate and construct flood protections projects.
D - Maintain or establish natural landscape features and hydrologic processes that are critical to sustainable ecosystems structure and function, including dissipation of storm energy.
E - Establish or maintain dynamic salinity gradients that reflect natural cycles of freshwater availability and marine forcing (fluctuation related to normal daily and seasonal tide action or exchange).
F - Sustain productive and diverse wildlife habitats.
G - Maximize retention of river-borne sediments and nutrients within coastal wetlands.



0 4.5 9 13.5
Miles

1:316,800
1 inch equals 5 miles

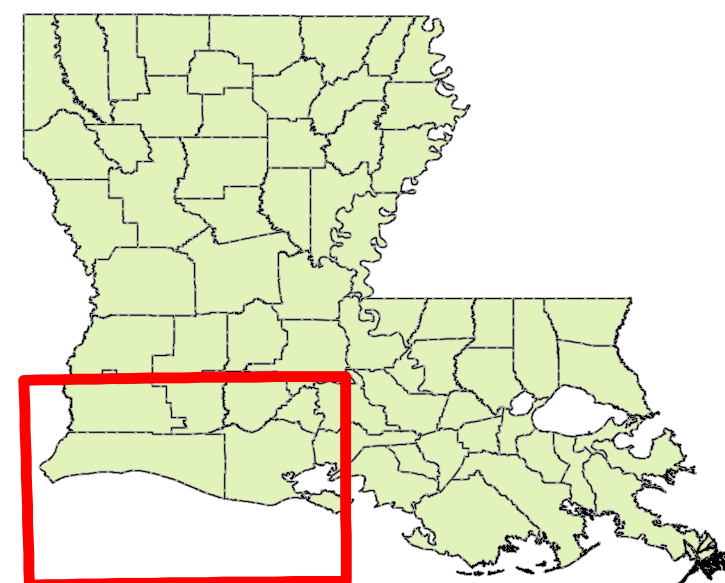
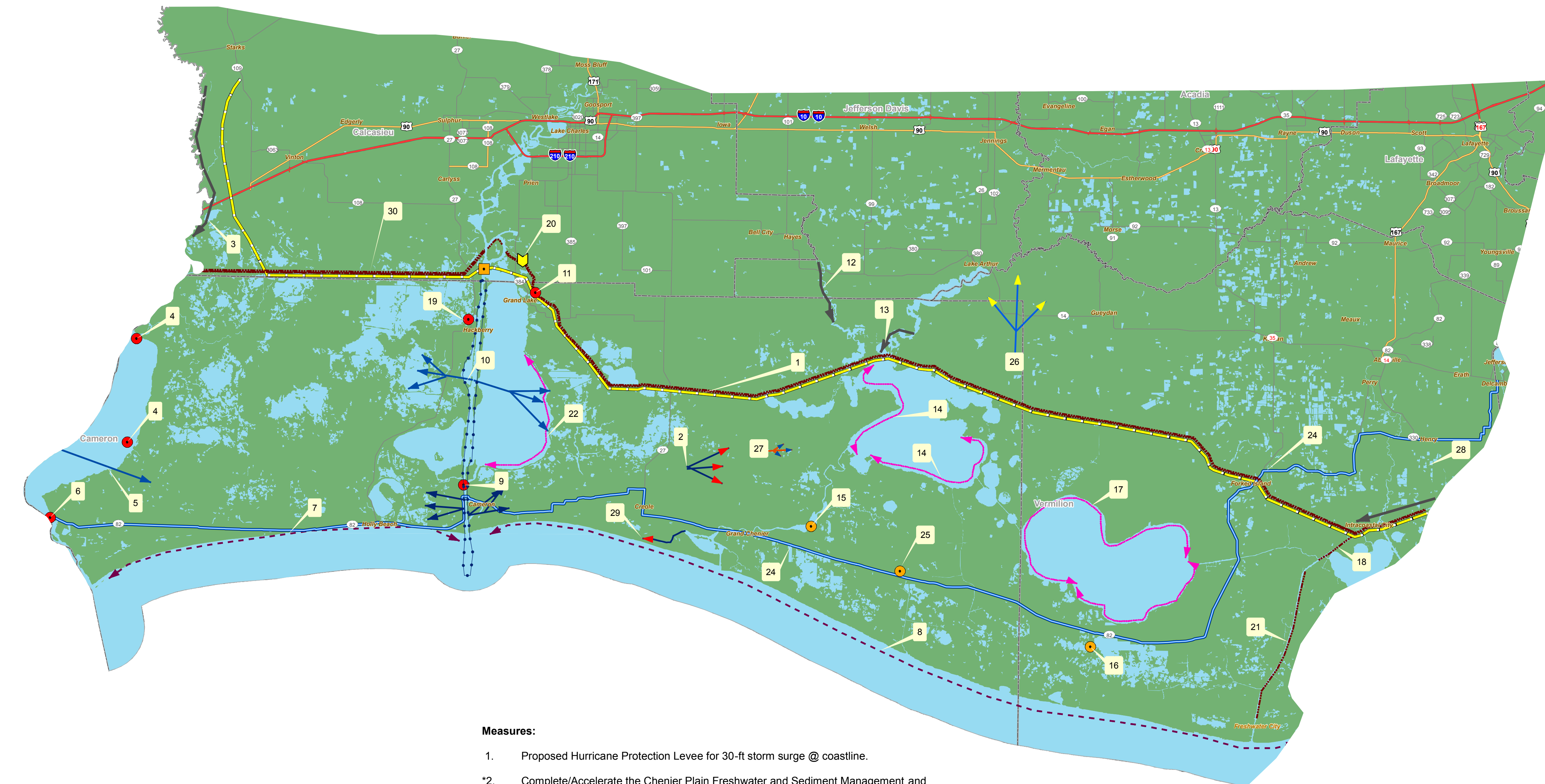
Legend

- Navigation Lock
- Flood Gate
- Freshwater Control Structure
- Salinity Control Structure
- Levee Alignment
- Evacuation Route
- Dredge Material Placement
- Freshwater Introduction
- Bankline Stabilization
- Shoreline Protection
- Shoreline Stabilization
- Beneficial Use of Dredged Material
- Beneficial Use of Dredged Material

Measures:

1. Proposed Hurricane Protection Levee for 30-ft storm surge @ coastline.
- *2. Complete/Accelerate the Chenier Plain Freshwater and Sediment Management and Allocation Reassessment Study which was included in the LCA Near-Term Plan.
3. Maximize freshwater inflow from Sabine River.
4. Salinity Control structures along the east shoreline of Sabine Lake near Blue Buck Point, Sabine Island and Black Bayou.
5. Beneficial Uses of dredged material Program: utilize sediment from Sabine Ship Channel and dedicated dredging for marsh enhancement and construction of terraces.
6. Salinity control structure at Sabine Pass near Hwy 82 Causeway.
7. Stabilize Gulf shoreline and beach west of Calcasieu River to Sabine River using dredged sediment or breakwaters.
8. Stabilize Gulf shoreline and beach east of Calcasieu River to Freshwater Bayou using dredged sediment or breakwaters.
9. Salinity control structure in Calcasieu Ship Channel near ferry.
10. Beneficial Uses of dredged material Program: utilize sediment and dedicated dredging for marsh enhancement and construction of terraces in vicinity of Calcasieu Lake.
11. Salinity control structures at points on east side of Calcasieu Lake to aid in salinity control.
12. Maximize freshwater inflow to tributaries of the Mermentau from outside sources.
13. Maximize freshwater inflow to Mermentau from outside sources.
14. Stabilize Grand Lake shoreline and land bridge.
15. Freshwater Introduction/Retention structure or sill on Little Pecan Bayou.
16. Freshwater Introduction/Retention structure or sill on Rollover Bayou.
17. Stabilize White Lake shoreline.
18. Stabilize banks from Schooner Bayou to GIWW along Freshwater Bayou and along GIWW near White Lake.
19. Salinity Control on Black Lake Bayou near Hackberry.
20. Build new chamber for navigation at Calcasieu Lock on GIWW and use old lock to evacuate excess water.
21. Stabilize banks of Freshwater Bayou.
22. Stabilize eastern shore of Lake Calcasieu.
- *23. Develop a plan to elevate and/or relocate assets located outside the hurricane protection Levee.
24. Maintain Hwy 82 for hurricane evacuation and marsh protection.
25. Provide water control structures at strategic locations along Hwys 82 and 27.
26. Manage watershed to reduce rapid inflows into Mermentau Sub-basin.
27. Restore Marsh by Filling Abandoned Canals.
28. Utilize freshwater inflow from Atchafalaya River.
29. Improve hydrology of the old Mermentau River Channel between Mud Lake and GOM.
30. Stabilize Banks of GIWW.

* Not tied to specific geographic location.



LOUISIANA COMPREHENSIVE COASTAL
PROTECTION MASTER PLAN

FIGURE 6.4
PLANNING UNIT 4
ALTERNATIVE ONE



0 2.5 5 10 15
Miles

1:316,800
1 inch equals 5 miles

Legend

- Navigation Lock
- Floodgate
- Freshwater Control Structure
- Salinity Control Structure
- Levee Alignment
- Evacuation Route
- Dedicated Dredging
- Bank Stabilization
- Freshwater Introduction
- Shoreline Protection (Lake)
- Shoreline Stabilization (Gulf)
- Beneficial Use of Dredged Material
- Dredge Material Placement
- Freshwater and Sediment Management
- Salinity Management

MEASURES:

- Storm surge protection for Lake Charles Metropolitan Area using ring levee.
- Storm surge protection for Lafayette using ring levee.
- Storm surge protection around Abbeville, Gueydan, Kaplan, and Vinton.
- * Complete/Accelerate the Chenier Plain Freshwater and Sediment Management and Allocation Reassessment Study which was included in the LCA Near-Term Plan.
- Salinity Control at Black Bayou.
- Beneficial Uses of dredged material program: utilize sediment from Sabine Ship Channel and dedicated dredging for marsh enhancement and construction of terraces.
- Allow Calcasieu Lake and surrounding area to become and remain brackish to saline.
- Stabilize Gulf shoreline and beach west of Calcasieu River to Louisiana Point using dredged sediment and/or breakwaters.
- Stabilize Gulf shoreline and beach east of Calcasieu River to Freshwater Bayou using dredged sediments and/or breakwaters.
- Stabilize Grand Lake shoreline and land bridge.
- Stabilize White Lake shoreline and land bridge.
- Beneficial uses of dredged material program: utilize sediment and dedicated dredging for marsh enhancement and construction of terraces in vicinity of Calcasieu Lake.
- Dedicated dredging from the Gulf of Mexico for marsh creation and enhancement.
- Bank stabilization along Freshwater Bayou.
- Manage watershed to reduce rapid inflows into Mermentau Sub-basin.
- Bank stabilization from Schooner Bayou to GIWW along Freshwater Bayou and the GIWW.
- Maintain Hwy 82 for hurricane evacuation and marsh protection.
- Provide water control structures at strategic locations along Hwys 82 and 27.
- * Develop a plan elevate and/or relocate assets located outside the hurricane protection Levee.
- Stabilize Banks of GIWW
- Utilize fresh water inflow from Atchafalaya River.
- Build a new chamber for navigation at Calcasieu Lock and use the old lock to evacuate excess water.

* Not tied to specific geographic location.



LOUISIANA COMPREHENSIVE COASTAL
PROTECTION MASTER PLAN

FIGURE 6.5

**PLANNING UNIT 4
ALTERNATIVE TWO**

